ACCESSION NR: AT4010697

ENCLOSURE: 01

T°, K	Interval in secs. where K=constant	K, $\frac{mg^2}{sec.}$
1273	0,36	$1,53 \cdot 10^{-4}$
	0,36-1,8	$1 \cdot 10^{-4}$
1373	0-0,9	$3,3 \cdot 10^{-4}$
	0,9-4,5	$1,97 \cdot 10^{-4}$
1473	0-0,054	$14,7 \cdot 10^{-4}$
	0,054-0,18	$7,73 \cdot 10^{-4}$
	0,18-3,6	$0,00 \cdot 10^{-4}$

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ACCESSION NR: AT4010696 S/2601/63/000/017/0120/0131

AUTHOR: Borisova, V. I.; Dekhtyar, I. Ya.; Madatova, E. G.; Mikhalenkov, V. S.; Fedchenko, R. G.; Khazanov, M. S.

TITLE: Investigation of the effects of nonstationary heating on the changes in magnetic and electrical properties of heat-resistant alloy ZhS-6K

SOURCE: AN UkrRSR. Insty*tut metalofizy*ky*. Sbornik nauchny*kh trudov. no. 17, 1963. Voprosy* fiziki metallov i metallovedeniya, 120-131

TOPIC TAGS: alloy ZhS-6K, paramagnetic susceptibility, surface electrical resistance, heat treatment, phase transformation, eddy current, heat resistance, magnetism, alloy electrical property, heat resistant alloy

ABSTRACT: Application of new methods to the physical investigation of the phase and structural changes occurring during cyclic heat treatment of heat-resistant materials is very important. One of the methods used in this study is that of paramagnetic susceptibility, by means of which it is possible to determine the interrelationship between structural changes and the states of phases, whether these changes are successive or simultaneous, and to what extent they occur during the process of thermal fatigue. In addition to the above methods the following were also used: changes in thermal rigidity and

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ACCESSION NR: AT4010696

electrical resistance, form changes, and measurement of the surface electrical resistance with determination of losses due to eddy currents. The first task was the investigation of the effects of thermal stress on form changes and hardness of samples of the alloy subjected to cyclic heat treatment. The results obtained showed that the linear dimensions of alloys with high recrystallization temperatures did not change appreciably as a result of thermal cycles. It is interesting to note that after 250 thermocycles with cooling in water, breakage occurred without noticeable change in the length of the samples. Thermal rigidity of samples was measured in a standard VIM-1M apparatus. It was found that the changes in hardness resulting from thermal treatment depend not on thermal stresses but on changes in the fine crystalline structure of the alloys. The dependence of the electrical resistance of the alloy on heat changes during thermal treatment was studied by the potentiometric method using a standard PPTN bridge. It was found that resistance decreases up to 50 thermocycles. The absolute minimum occurs at about 325 cycles after which there is a continuous increase up to 600 cycles. The study of paramagnetic susceptibility showed that during heat treatment there was a continuous decrease in the hard solution of the matrix due to the alloying components. This process should cause a decrease in electrical resistance. The sharp increase after 325 cycles is

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ACCESSION NR: AT4010696

difficult to explain. For the exact explanation of the process involved it is necessary to employ new methods using structural sensitivity characteristics and phase composition. The study of paramagnetic susceptibility demands a thorough study of structural and phase changes occurring during cyclic heat treatment. For measurements of susceptibility a special unit was designed which utilized the compensatory method of measurement. The following conclusions were reached: cyclic heat treatment, with cooling in a stream of air, of thin samples 3 mm in diameter merely leads to acceleration of the aging process. With samples of complicated form a considerable stress gradient developed during heat treatment leading to an unbalanced redistribution of elements. Under these conditions the appearance of cracks is more probable. The study of paramagnetic susceptibility of the alloy showed that for 3mm samples susceptibility increases evenly. No anomalies were observed, a fact which is explained by the almost total absence of a gradient of thermal stresses during cooling. Orig. art. has 5 formulas, 7 figures, and 1 table.

ASSOCIATION: Insty*tut metalofizy*ky* AN UkrRSR (Institute of the Metallurgical Physics of Metals AN Ukr RSR)

SUBMITTED: 00 DATE ACQ: 31Jan 64 ENCL: 00

SUB CODE: MM NO REF SOV: 001 OTHER: 002

Card 2/3

ACCESSION NR: AT4010689 S/2601/63/000/017/0060/0063

AUTHOR: Dekhtyar, I. Ya.; Levina, D. A.

TITLE: The effect of small additions of gadolinium on the changes in magnetic properties of nickel during uniform compression.

SOURCE: AN UkrRSR. Insty*tut metalofizy*ky*. Sbornik nauchny*kh trudov, no. 17, 1963. Voprosy* fiziki metallov i metallovedeniya, 60-63

TOPIC TAGS: magnetism, nickel, gadolinium, ferromagnetism, compression, Curie point, magnetic saturation, nickel gadolinium alloy, magetostriction alloy.

ABSTRACT: The study of the magnetic properties of metals and alloys under uniform compression is of great interest, because of the possibility of obtaining information on the nature of the ferromagnetic state. In the present study the effect of small additions of gadolinium on the magnetic properties of Nickel alloys during compression was investigated. There was reason to suppose that large changes in magnetization at saturation under compression would be noticed in these alloys, because they were alloys of ferromagnetic metal, nickel with ferromagnetic gadolinium, both of which have body-centered

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lattices. In addition, the magnetostriction of paraprocesses of these alloys was studied. As was shown previously by the authors, the measurement of magnetostriction at two temperatures makes it possible to determine the magnitude of comparative changes in average atomic moment m_o with changes in manifold compression and to determine the magnitude of comparative change in the average interchange integral with the manifold compression. Electrolytic nickel with an initial purity of 99.93% was used. Alloys were prepared from this nickel and from metallic gadolinium 98.8% pure. The alloys were prepared in an electric arc furnace in an atmosphere of refined argon. Magnetization to saturation was measured at room temperature by the differential method. The sample was under pressure in a special vessel made of beryllium bronze. Uniform compression was obtained by a method based on the gallium property of increasing its volume upon solidification. It was found that small additions of gadolinium considerably increased the degree of magnetization during compression. Additions of 0.4% of gadolinium increased the degree of magnetization 20 times as much as compared with that of pure nickel. The measurement of magnetostriction of paraprocesses was done by the method described previously by the authors. It should be noted that the magnetostriction of alloys of nickel

with small amounts of gadolinium approached that of iron-nickel alloys. This fact shows the necessity of studying other properties of nickel and gadolinium. Orig. art. has: 3 formulas, 2 figures, and 1 table.

ASSOCIATION: Insty*tut metalofizy*ky* AN UkrRSR (Institute of Metallurgical Physics AN UkrRSR)

SUBMITTED: 00 DATE ACQ: 31Jan 64 ENCL: 00

SUB CODE: MM NO REF SOV: 004 OTHER: 007

ACCESSION NR: AT4013932 S/2659/63/010/000/0087/0092

AUTHOR: Dekhtyar, I. Ya.; Mirkin, I. L.; Mikhalenkov, V. S.; Fedchenko, R. G.; Volkova, T. I.; Blanter, M. S.

TITLE: Investigation of the paramagnetic properties of high temperature alloys on an iron and nickel base

SOURCE: AN SSSR. Institut metallurgii. Issledovaniya po zharoprochn*m splavam, v. 10, 1963, 87-92

TOPIC TAGS: paramagnetic steel, high temperature alloy, iron alloy, nickel alloy, chromium alloy, alloy paramagnetic property, paramagnetism

ABSTRACT: The temperature dependence of the paramagnetic properties of high temperature alloys on an iron and nickel base was investigated as a guide to their electronic structure and the effective number of electrons N. It was found that the maximum number of electrons for nickel-chromium alloys is found in those containing 10% Cr. Addition of niobium to an alloy of Ni + 16% Cr leads to significant increase in N. Investigation of complex alloys on a nickel-chromium base showed that the maximum N is observed in alloys with aluminum and titanium. Investigation of complex alloys on an iron-nickel-chromium base showed

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ACCESSION NR: AT4013932

that the effective magnetic moment connected with N is maximal in alloys containing tungsten and molybdenum, while niobium, titanium and aluminum lead to a decrease in N. The results obtained and their comparison with tensile strength studies show that the number of electrons in the bond found on the basis of the temperature dependence of paramagnetic sensitivity may characterize the strength of the interatomic bonds at high temperatures. Orig. art. has: 3 figures, 2 tables and 9 formulas.

ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute AN SSSR)

SUBMITTED: 00 DATE ACQ: 27Feb64 ENCL: 00

SUB CODE: ML NO REF SOV: 002 OTHER: 000

Card 2/2

DEKHTYAR, I.Ya.; NADATOVA, E.G.

Irreversible shape changes of pure metals during cyclic heat treatment. Sbor.nauch.trud. Inst.metallofiz. AN URSR no.19:74-78 '64. (MIRA 18:5)

DEKHTIAR, I.Ya.; LEVINA, E.A.; MIKHALENKOV, V.S.

Effect of plastic deformation on the annihilation spectra of positrons with electrons in metals. Sbor.nauch.trud. Inst. metallofiz. AN URSR no.19:127-131 '64. (MIRA 18:5)

DEKHTYAR, I.Ya.; POLOTNYUK, V.V.

Effect of changes in the density of dislocations during deformation and annealing on the magnetic characteristics of nickel. Sbor. nauch. trud. Inst. metallofiz. AN URSR no.20:67-79 '64. (MIRA 18:5)

L 44711-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(z)/EWP(b)/EWA(c) MJW/JD

ACCESSION NR: AT5008869 S/2601/64/000/020/0032/0041

AUTHOR: Dekhtyar, I. Ya.

TITLE: The thermal fatigue of metals

SOURCE: AN UkrSSR. Institut metallofiziki. Sbornik nauchnykh trudov, no. 20, 1964. Voprosy fiziki metallov i metallovedeniya (Problems in the physics of metals and physical metallurgy), 32-41

TOPIC TAGS: metal fatigue, metal thermal fatigue, thermal stress, electron vacancy, alloying, steel fatigue, dislocation structure/steel 35, Nimonic 75

ABSTRACT: The author examines and generalizes certain experimentally determined regularities in the phenomena characterizing thermal fatigue caused by cyclic thermal stresses, using energy considerations in the discussion of metal failure. Equations are derived which express the life of a metal and the concentration of vacancies due to thermal stresses. It is shown that in order to increase the life a metal, a structure should be created which is characterized by a large value of n_j, the number of steps on the dislocations. In other words, the dislocation structure should be refined, and the energy of formation of vacancies should be increased, for example by alloying the metal. The

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L 44711-65

ACCESSION NR: AT5008869

temperature dependence of the life of steel 347 and Nimonic 75 is illustrated graphically. Orig. art. has: 2 figures, 1 table, and 15 formulas.

ASSOCIATION: Institut metallofiziki, AN Ukr SSR (Institute of the Physics of Metals, AN UkrSSR)

SUBMITTED: 05Apr64 ENCL: 00 SUB CODE: MM, TD

NO REF SOV: 006 OTHER: 008

Card 2/2

L 49038-65 EWT(l)/EWT(m)/EWA(d)/EWP(t)/EPR/EWP(k)/EWP(b)/EWA(c) Pf-4/Pn-4
IJP(c) JD/HW
ACCESSION NR: AP5006901 S/0181/65/007/003/0893/0898

AUTHOR: Dekhtyar, I. Ya.; Fedchenko, R. G. 39 21

TITLE: Effect of plastic deformation and quenching on paramagnetic properties of aluminum 27

SOURCE: Fizika tverdogo tela, v. 7, no. 3, 1965, 893-898

TOPIC TAGS: aluminum, paramagnetic property, plastic deformation, quenching, conduction electron, state density, Fermi end point energy

ABSTRACT: To determine more precisely the cause of the decrease in the paramagnetic susceptibility of aluminum following plastic deformation, the authors make use of earlier results by one of them (Dekhtyar, with V. S. Mikhalenkov, FTT v. 5, 2997, 1963), where it was shown that in the case when the paramagnetism of the metal is determined by the paramagnetism of its ions, the influence of plastic deformation reduces to a change in the exchange interaction and in the magnetic moment, due to a change in the interatomic distance in regions surrounding the dislocations. Tests involving plastic deformation and multiple quenching from different temperatures of pure aluminum (99.9%) have shown that the plastic defor-

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L 49038-65
ACCESSION NR: AP5006901

mation or repeated quenching from 520--650C decreases the paramagnetic susceptibility of aluminum in proportion to the quenching temperature. This phenomenon is explained by assuming that the change in the interatomic distances in aluminum, brought about by the deformation and the quenching, changes the distribution of the density of the electronic states. The change in susceptibility is then calculated on the basis of these assumptions and the assumption that the electron state density of the conduction electrons is altered because of the change in the Fermi end point energy. An estimate shows that for a crystal with dislocation density ~ 2 x x 10^{11} cm^{-2} the change in susceptibility is ~ 10%. Experimental results, made with a set-up similar to that described by Beinswenger and Wachtel (Zs. Metallkunde v. 46, 504, 1955) gave a decrease in susceptibility of ~ 8%. "The authors thank M. A. Krivoglaz for a valuable discussion of the results." Orig. art. has: 4 figures and 9 formulas.

ASSOCIATION: Institut metallofiziki AN UkrSSR, Kiev (Institute of the Physics of Metals, AN UkrSSR)

SUBMITTED: 24Feb64 ENCL: 00 SUB CODE: MM, EM

NR REF SOV: 003 OTHER: 006

Card 2/2

DEKHTYAR, I.Ya.; DUBROVA, T.V.; POLOTNYUK, V.V.

Decrease of the distance between domain boundaries following plastic deformation of a single crystal of Fe + 3% Si. Ukr. fiz. zhur. 10 no.8:922-924 Ag '65. (MIRA 18:8)

1. Institut metallofiziki AN UkrSSR, Kiyev.

L 10777-66 EWT(1)/EWT(m)/EWP(t)/EWP(k)/EWP(b)/EWA(c) IJP(c)
ACC NR: AP5028924 JD/HW/JG SOURCE CODE: UR/0185/65/010/011/1261/1263

AUTHOR: Dekhtyar, I. Ya.; Fedchenko, R. H. 44,55 44,55 44,55

ORG: Institute of Metal Physics, AN UkrSSR, Kiev (Instytut metalofizyky AN URSR)

TITLE: The effect of plastic deformation and hardening of palladium and platinum alloys with localized magnetic moments on their paramagnetic properties 27 27

SOURCE: Ukrayins'kyy fizychnyy zhurnal, v. 10, no. 11, 1965, 1261-1263

TOPIC TAGS: palladium alloy, platinum alloy, magnetic susceptibility, magnetic moment, iron, silver, plastic deformation, metal property

ABSTRACT: This work was performed as a result of increasing interest in the magnetic behavior of very dilute alloys with localized magnetic moments. In this investigation a study was made of the effect of plastic deformation and tempering on paramagnetic properties of alloys containing 1 and 3 atom % of Fe. It was found that after multiple hardening of Pd + 1 at. % Fe and Pd + 25 at. % Ag + 1 at. % Fe at. 900, 1000, and 1100C, their paramagnetic susceptibility increases with the increasing number of tempering cycles and temperature (Fig. 1).

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L 10777-66

ACC NR: AP5028924

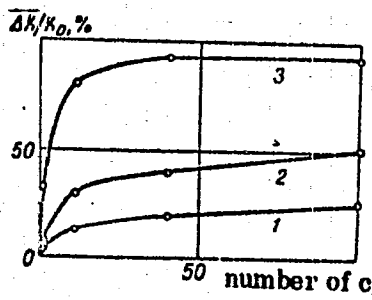

Figure 1. Relative changes of paramagnetic susceptibility of Pd + 1 at. % Fe alloy as a function of the number of cycles and tempering temperature. 1 - T = 900G, 2 - 1000C, 3 - 1100C.

The large increase in magnetic susceptibility due to heat treatment is explained on the basis of the interaction between iron atoms and the defects produced during high-temperature treatment. Iron atoms pass into the supermagnetic state. The size of the supermagnetic particles was found to be several angstroms. Plastic deformation has no effect on the magnetic susceptibility of palladium and its dilute solutions. The nature of changes of the magnetic susceptibility of dilute solutions of Pt under the influence of deformation and hardening differs from those of Pd. This is explained by the difference of the interaction of Fe atoms with Pd and with Pt as well as by the difference in the nature of the solvents. Orig. art. has: 2 figures and 1 formula.

Card 2/2 SUB CODE: 11 / SUBM DATE: 10May65 / ORIG REF: 002 / OTH REF: 002

L 8574-66 EWT(l)/EWT(m)/EPF(n)-2/T/EWP(z)/EWA(h)/EWA(c)/EWP(b)/EWA(d)/EWP(w)/EWP(t)
ACC NR: AT5023810 IJP(c) GG/HW/JD SOURCE CODE: UR/0000/62/000/000/0294/0305

AUTHOR: Dekhtyar, I. Ya.; Shalayev, A. M.

ORG: none

TITLE: Change in the physical properties of ferromagnetic metals and alloys due to gamma ray irradiation

SOURCE: Soveshchaniye po probleme Deystviye yadernykh izlucheniy na materialy. Moscow, 1960. Deystviye yadernykh izlucheniy na materialy (The effect of nuclear radiation on materials); doklady soveshchaniya. Moscow, Izd-vo AN SSSR, 1962, 294-305

TOPIC TAGS: alloy, ferromagnetic alloy, alloy property, ferromagnetic property, property change, irradiation induced change, alloy irradiation, neutron irradiation

ABSTRACT: The effect of gamma irradiation on the galvanomagnetic effect and coercive force (H_c) of iron, nickel, and Ni_3Mn, Fe_3Al, and Ni_3Fe alloys annealed and quenched from various temperatures has been investigated. The irradiation-induced changes in their magnetic properties generally proceeded in the same direction as those produced by conventional heat treatment (thermal ordering). Gamma irradiation induced the ordering of metals in the disordered condition, promoted further ordering of the metals incompletely ordered by heat treatment, but had a disordering effect on the metals completely ordered by heat treatment. Irradiation at 140 and 240C accelerated the change in the galvanomagnetic effect and

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L 8574-66
ACC NR: AT5023810

H_c, and this change was greater than that produced by heat treatment. The interaction of gamma radiation with a metallic substance led to the formation of Frenkel pairs and other more complex defects (most probably dislocation loops). In irradiation of nickel annealed and quenched from 900, 1000, or 1040C, the course of the changes in H_c was similar to that in low-temperature tempering of a high-temperature quenched ferromagnetic. At the same time, the relative change in H_c was not equivalent to that produced with low-temperature tempering, probably because of a difference in the number of dislocation loops caused by annealing and quenching. Theoretical analysis showed that as the time of exposure to irradiation increases, H_c should increase and approach saturation, and the magnitude of the flux. In general, gamma ray irradiation of a high-temperature annealed and quenched ferromagnetic leads to changes in H_c due to paired defects formed during heat treatment and to the gamma-ray-induced effect, which is similar to low-temperature tempering. Gamma irradiation slowed down the movement of domain boundaries in ferromagnetic materials, probably because of the deceleration of a moving boundary layer by the defects originated by gamma irradiation. Gamma irradiation also substantially increased the relaxation of the internal stresses in plastically deformed ferromagnetic alloys, and in this respect, the effect of gamma irradiation was similar to the effect of neutron irradiation. [MS]

SUB CODE: 11,18/ SUBM DATE: 18Aug62/ ORIG REF: 004/ OTH REF: 005

jw
Card 2/2

L 15388-66 EWT(1)/EWT(m)/EWP(j)/T/EWP(t)/EWP(b)/ETC(m)-6 IJP(c) WW/RM/JD
ACC NR: AP5026983 SOURCE CODE: UR/0020/65/164/005/1032/1034

AUTHOR: Dekhtyar, I. Ya.; Fedchenko, R. G. 69 B

ORG: Institute of the Physics of Metals, Academy of Sciences UkrSSR (Institut metallofiziki Akademii nauk UkrSSR)

TITLE: The influence of plastic deformations on the magnetic susceptibility of solid solutions 21,44,55

SOURCE: AN SSSR. Doklady, v. 164, no. 5, 1965, 1032-1034

TOPIC TAGS: plastic deformation, magnetic susceptibility, solid solution, lattice defect

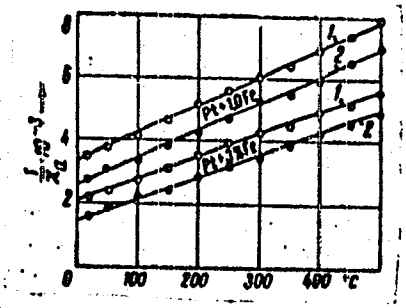
ABSTRACT: The present article discusses experimental results describing the influence of plastic deformations on the paramagnetic susceptibility of diluted solid solutions of Fe in Pt. Results are summarized in Figure 1 and Table 1. 44,55 18 27 27

CARD 1/3

UDC: 538.214:539.374

L 15388-66

ACC NR: AP5026983



1 - when annealed;

2 - when deformed.

Figure 1. Temperature dependence of the reciprocal of the iron susceptibility of iron in alloys.

ε, %	30	65	80
$(\Delta\chi/\chi_0)_{300°}$, %	6,0	10,4	16,2
$\Delta p/p_0$, %	5,2	10,5	17

Table 1. Changes in the susceptibility of the Pt + 1 wt % Fe at 250C and of the magnetic moment per iron atom within the alloy as a result of plastic deformation.

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L 15388-66

ACC NR: AP5026983

The results are in good agreement with previous theoretical predictions (Fiz. tverd. tela, 7, 893 (1965)). Plastic deformation of solid solutions does not only affect the atomic structural state, but the electronic state of the solutions as well. The paper was presented by Academician G. V. Kurdyumov, 3 Jun 65. Orig. art. has: 2 formulas, 2 figures, and 1 table.

SUB CODE: 20/ SUBM DATE: 27May65/ ORIG REF: 006/ OTH REF: 004

CARD 3/3

L 34099-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/HW/GD

ACC NR: AT6013830

SOURCE CODE: UR/0000/65/000/000/0035/0043

AUTHOR: Borisova, V. I.; Dekhtyar, I. Ya.; Madatova, E. G.

ORG: Institute of Metal Physics, AN UkrSSR (Institut metallofiziki AN UkrSSR)

TITLE: Change of the magnetic properties of nickel during cyclic thermomagnetic treatment

SOURCE: AN UkrSSR. Issledovaniye nesovershenstv kristallicheskogo stroyeniya (Study of imperfections in crystal structure). Kiev, Naukova dumka, 1965, 35-43

TOPIC TAGS: nickel, thermomagnetic effect, magnetostriction, thermal stress, magnetization, magnetic permeability, magnetic coercive force

ABSTRACT: The effect of cyclic thermal treatment in a magnetic field on the coercive force, magnetization, and magnetic permeability of nickel was studied for the first time. Vacuum-remelted nickel specimens were vacuum-annealed for 4 hr at 900C to relieve the stresses, then subjected to cyclic thermal treatment (repeated quenchings) at 250—1100C both in the absence of a magnetic field and in the presence of a longitudinal or transverse magnetic field. A 25—30% reduction in the increase of the coercive force was observed after cyclic thermal treatment in the longitudinal field as compared to the same treatment in the absence of a field. A sharp reduction of this kind was also observed in the transverse field. Cyclic thermal treatment was found to cause a decrease in the magnetization and permeability of nickel, this

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L 34099-66

ACC NR: AT6013830

being directly related to the data on the reduction in the increase of the coercive force. The effects observed are interpreted in terms of the general aspects of the theory of thermomagnetic treatment. The combined action of magnetostrictive and thermal stresses during the quenching of nickel from temperatures above the Curie point causes a decrease in the number of dislocation sources, and this in turn results in a smaller increase of the coercive force. Orig. art. has: 4 figures, 3 tables, and 5 formulas.

SUB CODE: 11 / SUBM DATE: 23Jul64 / ORIG REF: 006 / OTH REF: 008

Card 2/2 vmb

L 41025-66 EWT(m)/T/EWP(w)/ETI/EWP(t) IJP(c) JD/HW/GD

ACC NR: AT6009601 (N) SOURCE CODE: UR/0000/65/000/000/0112/0119

AUTHOR: Dekhtyar, I. Ya.; Mikhalenkov, V. S.; Sakharova, S. G.

ORG: Institute of Metal Physics, AN UkrSSR (Institut metallofiziki AN UkrSSR)

TITLE: Effect of packing defects on the spectra of annihilation of positrons with electrons in nickel-copper alloys

SOURCE: AN UkrSSR. Fizicheskaya priroda khrupkogo razrusheniya metallov (Physical nature of brittle failure of metals). Kiev, Izd-vo Naukova dumka, 1965, 112-119

TOPIC TAGS: lattice defect, particle annihilation, positron, electron, nickel base alloy, copper alloy

ABSTRACT: So far no direct experimental findings have been obtained on the effect of packing defects on the energy spectrum of electrons. To fill this gap, the authors investigated the variation of this spectrum by the method of the annihilation of positrons with electrons, since this method provides information on the effect of plastic deformation on the energy spectrum of electrons. Pure Ni as well as its alloys with 10, 20 and 30% Cu were investigated (as the Cu content increases to 30%, the energy of the packing defects in these alloys decreases al-

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L 41025-66

ACC NR: AT6009601

most three times), proceeding from the premise that, given an identical degree of deformation (~80% in this case) of the specimens of the alloys investigated, the density of packing defects will be the higher the greater is the probability α of their formation. The specimens were deformed by rolling. Curves of the angular distribution of γ-quanta during annihilation of positrons with electrons in the investigated alloys in vacuum-annealed (900°C for 3 hr) and deformed states were plotted with the aid of a shielded-emitter unit. The positron source was the isotope Na-22 (activity 3 μcuries). Findings: the maximum variations in the annihilation spectra were recorded for the alloy with the greated probability of formation of packing defects and the lowest energy of packing defects, i.e. for the alloy with 30% Cu. For the deformed specimens the curve of angular distribution of γ-quanta is steeper than for the annealed specimens. This means that, since most of the annihilation acts take place on d-electrons, (and thus the density of occupied states in the d-band increases), the mean electron momentum in the d-shell decreases for specimens in deformed state. The formation of a packing defect, with its attendant decrease in the mean electron momentum in the d-band, must lead to an increase in the maximum annihilation rate; this decrease is also associated with the decrease in the effective mass of electrons. This project is the first of a series devoted to the investigation of the relationship between the electron structure of alloys and packing defects. Orig. art. has: 3 figures, 3 formulas.

SUB CODE: 20, 13, 11/ SUBM DATE: 12Oct64/ ORIG REF: 001/ OTH REF: 006

Card 2/2 hs

DEKHTYAR, I.Ya.; FEDCHENKO, R.G. [Fedchenko, R.H.]

Effect of plastic deformation and hardening on the paramagnetic properties of palladium and platinum alloys with localized magnetic moments. Ukr. fiz. zhur. 10 no. 11:1261-1263 N '65.
(MIRA 18:12)

1. Institut metallofiziki AN UkrSSR, Kiyev. Submitted May 10, 1965.

L 44453-66 EWT(m)/EWI(t)/ETI IJP(c) JD/JG

ACC NR: AP6018940 SOURCE CODE: UR/0126/66/021/006/0833/0842

AUTHORS: Dekhtyar, I. Ya.; Fedchenko, R. G. 44 13

ORG: Institute for Metal Physics, AN UkrSSR (Institut metallofiziki AN UkrSSR)

TITLE: Influence of quenching on the magnetic susceptibility of palladium alloys containing small amounts of iron

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 6, 1966, 833-842

TOPIC TAGS: palladium alloy, magnetic alloy, magnetic susceptibility, magnetic structure

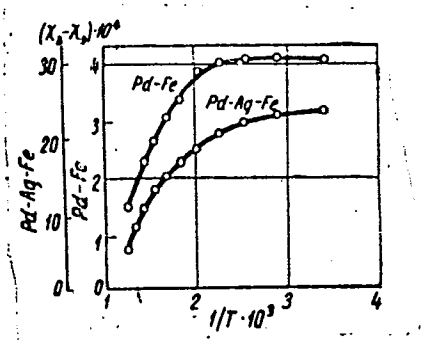
ABSTRACT: The effect of quenching (from high temperature) of Pd + 1 at. % Fe and Pd + 25 at. % Ag + 1 at. % Fe alloys on the paramagnetic susceptibility of these alloys was investigated. The experimental procedure employed is described by I. Ya. Dekhtyar and V. S. Mikhalenkov (Sb. Voprosy fiziki metallov i metallovedeniya, No. 12, Kiyev, Izd. AN UkrSSR, 1961, str. 46). The experimental results are presented graphically (see Fig. 1). It was found that repeated quenching of the alloys leads to an anomalous increase in the magnetic susceptibility of the alloys, which is ascribed to the formation of stable complexes between iron atoms and vacancies. The latter are believed to have been formed during the cyclic quenchings. This conclusion is supported by results on positron annihilation reported by A. T. Stewart (Canad. J. Phys., 1957, 35, 168).

Card 1/2 UDC: 538.22:546.621

L 44453-66

ACC NR: AP6018940

Fig. 1. Temperature dependence of the change in magnetic susceptibility after 100 quenching cycles from 1000C.



Orig. art. has: 10 graphs and 11 equations.

SUB CODE: 11,20/SUBM DATE: 10May65/ ORIG REF: 006/ OTH REF: 011

Card 2/2

L 41713-66 EWT(m)/T/EWP(t)/ETI/EWP(k) IJP(c) JD/HW/JG

ACC NR: AP6019528 (N) SOURCE CODE: UR/0020/66/168/004/0785/0787

AUTHOR: Dekhtyar, I. Ya.; Mikhalenkov, V. S.; Sakharova, S. G.

ORG: Institute of Metal Physics, Academy of Sciences UkrSSR (Institut metallofiziki Akademii nauk UkrSSR)

TITLE: Annihilation of positrons by electrons in plastically deformed metals with bcc lattice

SOURCE: AN SSSR. Doklady, v. 168, no. 4, 1966, 785-787

TOPIC TAGS: particle annihilation, electron positron pair, electron spectrum, deformed metal, plastic deformation, crystal dislocation phenomenon, crystal defect

ABSTRACT: This is a continuation of earlier work (DAN v. 156, 795, 1965) where it was shown that an investigation of annihilation spectra in plastically deformed metals discloses changes in the electron energy spectrum. The present article reports results obtained for Ta, Nb, Fe, and Fe + 0.63% Al and Fe + 1.08% Al solid solutions. The procedure used to obtain the annihilation spectra was described earlier (Vopr. fiz. met. i metallovedeniya, no. 12, 46, 1961). The apparatus was modified to provide accumulation of larger statistical material. The angular distribution of the annihilation photons was plotted first for the stressed and then for the annealed material. The stress was produced by rolling in two mutually perpendicular directions and the strain was 75-80% in all samples. The results indicate that the s- and d-electrons become redistributed in the distortion field around the

Card 1/2 UDC: 539.21

L 41713-66

ACC NR: AP6019528

dislocations. Proof that the observed change in shape of the annihilation spectra is due to dislocations and not to point defects is the fact that annealing demonstrates these changes to occur at temperatures corresponding to intense dislocation. The elastic properties of the metal govern the maximum polarization, the excess dislocation charge, and the relative change of the annihilation rates, so that the measurement of the spectra yields new data on the electronic nature of defects of the dislocation type. As in the earlier work, the maximum intensity of the spectrum is increased by the deformation, but the half-width of the annihilation curve decreases. Alloying with aluminum, by affecting the stacking-fault energy, increases the polarization, but there are not enough data to explain this fact. Nor are the data sufficient to explain the specific features of the different crystal structures and their relation to the annihilation spectra. This report was presented by Academician G. V. Kurdyumov 11 September 1965. Orig. art. has: 2 figures, 5 formulas, and 1 table.

SUB CODE: 20/ SUBM DATE: 31Aug65/ ORIG REF: 004/ OTH REF: 001

ACC NR: AT7005257 SOURCE CODE: UR/0000/66/000/000/0049/0064

AUTHORS: Dekhtyar, I. Ya.; Fedchenko, R. G.

ORG: Institute of Physics of Metals, AN UkrSSR (Institut metallofiziki AN UkrSSR)

TITLE: Change in the magnetic properties of dilute solid solutions based on Pd and Pt in hardening and in plastic deformation

SOURCE: AN UkrSSR. Elektronnyye svoystva metallov i splavov (Electronic properties of metals and alloys). Kiev, Izd-vo Naukova dumka, 1966, 49-64

TOPIC TAGS: magnetic susceptibility, paramagnetic susceptibility, metal heat treatment, plastic deformation, palladium base alloy, platinum base alloy, silver containing alloy, iron containing alloy, magnetic property

ABSTRACT: The effect of cyclic heat treatment and plastic deformation on the paramagnetic properties of alloys based on palladium and on platinum is investigated. The compositions were: Pd + 1 at. % Fe and Pd + 25 at. % Ag + 1 at. % Fe and Pt + 1 at. % Fe and Pt + 3 at. % Fe. The alloys were prepared in an arc furnace. The paramagnetic susceptibility was measured with a pendulum balance, and the susceptibility was [illegible] as a function of temperature to 500C. The starting state was achieved by [illegible]ing the specimens at 1100C for 2 hrs. Hardening was produced with cyclic heating to 900, 1000, and 1100C, followed by rapid cooling in water. The paramagnetic susceptibility of palladium alloys at room temperature increases as a result of multiple hardening

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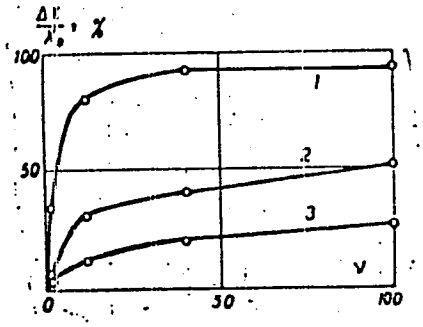
ACC NR: AT7005257

Fig. 1. Relative change in paramagnetic susceptibility as a function of number of cycles ν and temperature of hardening for Pd + 1 at. % Fe as measured at room temperature: 1 - 1100C; 2 - 1000C; 3 - 900C



(see Fig. 1). Plastic deformation of the palladium alloys did not markedly affect the paramagnetic susceptibility or the magnetic moment. No significant increase in paramagnetic susceptibility was observed in the platinum alloys after plastic deformation. Hardening did not change the susceptibility of the Pt-Fe alloys. Orig. art. has: 13 graphs and 12 formulas.

SUB CODE: 20/11/SUBM DATE: 16Jun65/ ORIG REF: 006/ OTH REF: 009

Card 2/2

S/032/60/026/012/019/036
B020/B056

AUTHORS: Kobrin, M. M. and Dekhtyar, I. I.

TITLE: Deformation Correction and the Precise Representation of the Bühler Method of Direct Determination of Residual Stresses

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol. 26, No. 12, pp. 1392-1398

TEXT: In the present paper, a deformation correction is suggested, which permits an exact consideration of the deformations caused by cutting. The possibility is shown to record an exact deformation curve by means of the correction mentioned, and thus also accurately to calculate the residual stresses from one single equation using the direct Sachs method. The authors also suggest a new combined method of determining the residual stresses, which consists in introducing a correction into the curve of the dependence of the change in the respective deformation δ or ε upon the variable surface F of the ground and treated cylinder (disk). The introduction of the correction permits calculation of the residual stresses both from the separated (for the sections of the preceding and final cutting) and from

Card 1/3

single relations (for grinding and treating along the entire radius). The suggested introduction of the correction is demonstrated on the basis of the calculation of residual stresses in a disk from the relations mentioned. For the introduction of corrections for the deformation measured in the final stage of cutting, the final extent of the deformation, determined after the preceding grinding or treatment has been carried out, is used. The ratio between the deformations on the external and internal surface of a disk with residual stresses, which had been cut open to a ring having the radius r, is investigated (Fig. 1). The results obtained by checking the method are shown in Figs. 2 and 3 in form of the deformation curves and diagrams representing the residual stresses. In Table 1 the residual stresses for the ground sections after introduction of corrections according to the method suggested by the authors together with the respective results according to the method developed by L. A. Glikman and A. N. Babayev are compared with one another. The results obtained for the residual stresses with a correction carried out according to both methods show a perfect agreement. The method suggested by Bühler for the calculation of residual stresses by means of a single deformation curve may be seen from

Deformation Correction and the Precise Representation of the Bühler Method of Direct Determination of Residual Stresses

S/032/60/026/012/019/036
B020/B056

the diagrams given in Fig. 4. The curves of the axial and diametral deformation for the ground and treated sections of a brass cylinder are given, in which the direct Sachs method was used. Table 2 compares the axial, circular, and radial residual stresses for a final ground section determined by three methods of calculation. The results obtained show that the quantities found by means of the single formulas using the single deformation curves and the separate procedures show full agreement. There are 4 figures, 2 tables, and 8 references: 5 Soviet and 3 German.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut stroitel'nykh konstruktsiy (Central Scientific Research Institute of Structural Parts). Vsesoyuznyy nauchno-issledovatel'skiy institut mekhanizatsii sel'skogo khozyaystva (All-Union Scientific Research Institute of Agricultural Mechanization)

Card 3/3

KOBRIN, M.M.; DEKHTYAR', L.I.

Using Sachs' method of determining internal stresses in pressed joints. Zav. lab. 27 no. 12:1523-1527 '61. (MIRA 15:1)

1. TSentral'nyy nauchno-issledovatel'skiy institut stroitel'nykh konstruktsiy i Gosudarstvennyy vesesoyuznyy nauchno-issledovatel'skiy tekhnologicheskiy institut remonta i ekspluatatsii mashinno-traktornogo parka.

(Cylinders—Testing) (Strains and stresses)

40671

S/032/62/028/009/005/009
B104/B102

10.6200

AUTHORS: Kobrin, M. M., and Dekhtyar', L. I.

TITLE: Improved extrapolation and checking of the incomplete diagram in determining residual stresses by the Sachs method

PERIODICAL: Zavodskaya laboratoriya, v. 28, no. 9, 1962, 1117 - 1121

TEXT: It is suggested that when determining the residual stresses according to G. Sachs (Z. Metallkunde, 18, 9, 352 (1927)) the extrapolation of the final section of the deformation curve should be replaced by interpolation. The cylindrical samples are indented on one side only and their deformation makes it possible to draw complete and incomplete diagrams of the residual stresses. The initial and final sections of the deformation curves can be determined. The difficult operation of cutting the samples in order to establish the incomplete diagram for the peripheral zones is limited to partial cuts. The validity of the principle of fictitious deformation and of the assumed conservation of residual stresses in the remaining portion when the material is cut on one side only is examined. There are 3 figures.

Card 1/2

S/032/62/028/009/005/009
B104/B102

Improved extrapolation and checking of ...

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut stroitel'nykh konstruktsiy (Central Scientific Research Institute of Structural Parts). Gosudarstvennyy nauchno-issledovatel'skiy tekhnologicheskiy institut remonta i ekspluatatsii mashino-traktornogo parka (State Scientific Research Technological Institute for the Repair and Utilization of Tractors and Agricultural Machinery)

Card 2/2

DEKHTYAR', L.I.

Finishing and hardening of deposited metals. Sbor. rab. GOSNITI no. 17:56-60 '62. (MIRA 17:9)

DEKHTYAR', L.I., inzh.

Effect of build-up welding and edge-knurling thickness on the fatigue strength of reconditioned agricultural machine shafts. Svar.proizv. no.1:20-22 Ja '63. (MIRA 16:2)

1. Gosudarstvennyy soyuznyy nauchno-issledovatel'skiy tekhnologicheskiy institut remonta i ekspluatatsii traktorov i sel'skokhozyaystvennykh mashin.
(Agricultural machinery--Maintenance and repair)
(Electric welding--Testing)

KOBRIN, M.M.; DEKHTYAR', L.I.

Dependence of the fatigue strength of steel on its properties and the residual stresses in hard-faced metal. Avtom. svar. 16 no.9: 19-25 S '63. (MIRA 16:10)

1. TSentral'nyy nauchno-issledovatel'skiy institut stroitel'nykh konstruktsiy Akademii stroitel'stva i arkhitektury SSSR (for Kobrin). 2. Gosudarstvennyy vsesoyuznyy nauchno-issledovatel'skiy tekhnologicheskiy institut remonta i ekspluatatsii mashinno-traktornogo parka (for Dekhtyar').

KOBRIN, M.M.; DEKHTYAR', L.I.

Through determination of residual stresses and the control of incomplete strain-stress diagrams in long rods of small diameters. Zav.lab. 30 no.4:472-476 '64. (MIRA 17:4)

1. TSentral'nyy nauchno-issledovatel'skiy institut stroitel'nykh konstruktsiy i Kishinevskiy sel'skokhozyaystvennyy institut.

KOBRIN, M.M., kand. tekhn. nauk; DEKHTYAR', L.I., inzh.

Cast and weld-on steels are cyclically durable materials for press-fitted parts. Vest. mashinostr. 45 no.7:36-40 Jl '65.
(MIRA 18:10)

PETROV, Yu.N.; DEKHTYAR', L.I.; NUD'GA, V.N.

Power method for the determination of residual stresses in electrolytic coatings obtained in the ultrasonic field. Elektrokhimiia 2 no.1:109-112 Ja '66. (MIRA 19:1)

1. Kishinevskiy sel'skokhozyaystvennyy institut imeni M.V. Frunze. Submitted May 20, 1965.

L 27346-66

ACC NR: AP6007703 SOURCE CODE: UR/0413/66/000/003/0082/0082

AUTHOR: Dekhtyar', L. I.

ORG: none

TITLE: A method for determining the residual voltages in galvanic coatings. Class 42, No. 178552

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 3, 1966, 82

TOPIC TAGS: strain gage, metal coating, metal cladding

ABSTRACT: This Author Certificate presents a method for determining the residual voltages in galvanic coatings. The method is based on the fact that the magnitude of the residual voltage is determined by strain gage measuring of the deformations of the sample. These deformations arise in the process of depositing the coating on the sample. The method increases the precision of the measurement. The tested specimen is pressed into the shape of a hollow cylinder for determining all three components of the residual voltage. Strain gages parallel to the axis and to the diameter are fastened to the outer or inner surface of this hollow cylinder. Then, in the process of depositing the coating, the value of all three components of the residual voltage along each section of the sample surface coating is calculated on the basis of the strain gage readings.

SUB CODE: 09, 14/ SUBM DATE: 03Aug63

Card 1/1 PB

UDC: 620.191.355

ACC NR: AP6026320 (A) SOURCE CODE: UR/0407/65/000/003/0045/0049

AUTHOR: Petrov, Yu. N. (Kishinev); Dekhtyar', L. I. (Kishinev); Safronov, I. I. (Kishinev); Beznosov, A. Ya. (Kishinev)

ORG: none

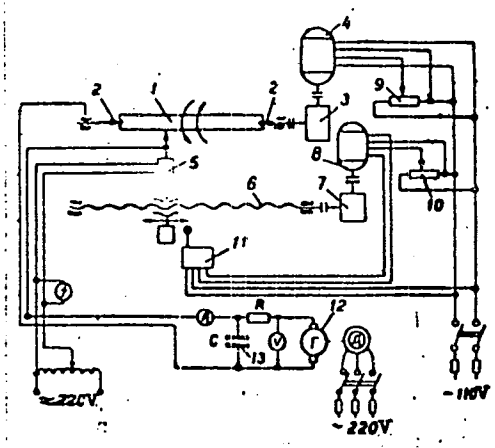
TITLE: Effect of working conditions of mechanized electrospark hardening on the resulting surface quality

SOURCE: Elektronnaya obrabotka materialov, no. 3, 1965, 45-49

TOPIC TAGS: electrospark hardening, steel, surface hardening

ABSTRACT: The results are reported of an experimental study of the effect of electrode-feed rate, work-piece rpm, number of passes, and electric system parameters upon the hardness and roughness of surface and work-piece size variation. In the experimental machine (see figure), piece 1 held by centers 2 is driven by d-c motor 4 through reducer 3. Electromagnetic vibrator 5 is axially moved by lead screw 6 driven by wormgear 7 and d-c motor 8. The work-piece

ACC NR: AP6026320



rpms are controlled by potentiometer 10. The vibrator travel is reversed by switch 11. Generator 12 and capacitor bank 13 supply the discharge circuit. Cylindrical pieces made from normalized steel-45 were experimentally hardened by T15K6 electrodes. It was found that: (1) The number of passes (1—4) and the working current (2.5—10 amp) have the greatest effect on the surface hardness and piece-size augmentation; the piece rpm and electrode-feed rate have a relatively small influence; (2) The surface roughness only very slightly depends on the above factors. Orig. art. has: 6 figures.

SUB CODE: 13, 09 / SUBM DATE: none / ORIG REF: 007

Card 2/2

ACC NR: AP7001204 (A,N) SOURCE CODE: UR/0407/65/000/05-/0117/0121

AUTHOR: Dekhtyar', L. I. (Kishinev); Beznosov, A. Ye. (Kishinev); Andreychuk, V. K. (Kishinev)

ORG: none

TITLE: Force method of determining residual stresses in coatings

SOURCE: Elektronnaya obrabotka materialov, no. 5-6, 1965, 117-121

TOPIC TAGS: metal coating, specialized coating, internal stress

ABSTRACT: Existing methods (such as G. Sachs', Z. f. Metallkunde, 19, 352, 1927) of determining residual stresses in various (electrolytic, electrospark, welded-on, metal-sprayed) metal coatings have serious drawbacks: they are inapplicable to those cases when elasticity moduli of the coating and the base metal are different; etching off the metal layers is associated with creating additional

Card 1/2

ACC NR: AP7001204

stresses; uniform etching is extremely difficult, etc. Hence, the veracity of results becomes questionable. A new method is suggested in which the residual stress is determined during the process of building-up the coating. A base-metal bar is rigidly fastened to a special holder, and a metal layer is deposited on one side only. Released from the holder, the bar buckles due to a residual stress. By applying a measured force to restore the bar to its original shape, the stress caused by the coating can be estimated. The bar then is fastened again to the holder, and the next layer is deposited, and so on. The method is claimed to be accurate and applicable to the different-base-coating-metals case. Orig. art. has: 4 figures and 14 formulas.

SUB CODE: 13 / SUBM DATE: none / ORIG REF: 006 / OTH REF: 001

Card 2/2

DEKHTYAR, L. M.

USSR/Physics - Magnetic Hysteresis, Rectangular 1 Dec 51

"Magnetic Hysteresis Loop Close in Shape to a Rectangle," M. V. Dekhtyar, L. M. Dekhtyar, Phys Faculty, Moscow State U imeni Lomonosov

"Dok Ak Nauk SSSR" Vol LXXXI, No 4, pp 533-536

Describes the results of applying the treatment of recrystn under load to Fe-Ni alloys and alloyed permalloy wires 0.5 mm thick. Previous expts (M. V. Dekhtyar, ibid. Vol LXIX, No 4, 1949) showed that polycrystallic ferromagnetic material subjected to recrystn while being stretched possesses a rectangular-shaped hysteresis loop. Submitted by Acad M. A. Leontovich 3 Oct 51.

202T88

USSR/ Physics

Card 1/1 Pub. 43 - 9/10

Authors : Dekhtyar, M. V.; Dekhtyar, L. M.; and Yurina, T. A.

Title : On the method of studying the phase transformations in non-metalic compounds (ferrites) and metallic alloys

Periodical : Izv. AN SSSR ser. fiz. 18/4, 502-510, Jul - Aug 1954

Abstract : A new device, developed by one of the authors, for studying the magnetic and non-magnetic characteristics of non-metallic compounds (ferrites) and metallic alloys is described. With the help of this device the following properties and processes can be easily observed or checked: phase transformations (from the paramagnetic into ferromagnetic state and vice versa), crystal formation in ferrites; dependence of magnetic and electric characteristics of ferrites at the temperature of their clinkering (magnetic permeamility and ohmic resistance); gradual decomposition of austenite at all stages. Eleven references: 8-USSR; 3-German (1929-1953). Diagrams. Graphs.

Institution : Physical faculty of M. V. Lomonosov University of Moscow

Submitted : May 13, 1954

DEKHTYAR', L.

Heating sand in silicate production. Stroi.mat., izdel.i konstr. 2 no.1:33 Ja '56. (MLRA 9:5)

1. Glavnyy inzhener zavoda silikatnogo kirpicha.
(Silicates)

KOLTUNOVSKAYA, B. (g. Zaporozh'ye); DEKHTYAR', L. (g. Zaporozh'ye).

Production of microporite has been started. Stroi. mat. 3 no.5:34 My '57. (MLRA 10:6)

1. Nachal'nik stroitel'noy laboratorii tresta "Zaporozhalyuminstroy" (for Koltunovskaya). 2. Glavnyy inzhener Dneprovskogo zavoda silikatnogo kirpicha (for Dekhtyar')
(Zaporozh'ye--Insulating materials) (Lightweight concrete)

DEKHTYAR, I.Ya.; DEKHTYAR, M.I.

Fluctuation of electron concentration in solid solutions. Izv.vys. ucheb.zav.;fiz. no.2:75-80 '60. (MIRA 13:8)

1. Kiyevskiy politekhnicheskiy institut.
(Solutions, Solid)

S/069/62/024/006/004/009
B101/B180

AUTHORS: Dukhin, S. S., Dekhtyar, M. I.

TITLE: The role of thermophoretic and diffusive forces in the generation of ice crystals near cold surfaces. I. Thermophoretic sedimentation of ice crystals generated near a cold semi-infinite plate

PERIODICAL: Kolloidnyy zhurnal, v. 24, no. 6, 1962, 674-677

TEXT: The effect of thermophoresis on the motion of ice crystals is calculated for a semi-infinite plate parallel to x the direction of the air flow. The path of the ice crystals is given by $y^2/b^2 + (\sqrt{x} - a)^2/a^2 = 1$. For the semi-axes a and b of the ellipse $a = C/2\gamma$ and $b = C/2\sqrt{\gamma}$, where $\gamma = (16\pi/30\mu)(k/8\pi m)^{1/2}\lambda T_1^{-1/2}$, $\mu = 8 - 10$, k is the Boltzmann constant, m the mean molecular weight of the air, λ the mean free path of the air molecules, T_1 the surface temperature, and C is an integration constant. The velocity distribution is given by

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$\eta = (uy^2/4\nu x)^{1/2}$, where u is the influx velocity of air, and the kinetic viscosity of the gas. The resulting graph shows that all the ice crystals appear on the plate at $\eta = 1.1$ and u = 30 m/sec. It is noted that near the surface of dry ice and of non-evaporating solids, ice crystals form under different conditions, since occurs in the former case diffusion phoresis. There is 1 figure. The most important English-language reference is: C. Shadt, R. Cadle, J. Colloid Sci., 12, 356, 1957.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii AN USSR, Kiyev
(Institute of General and Inorganic Chemistry of the AS UkrSSR, Kiyev)

SUBMITTED: September 14, 1961

Figure.

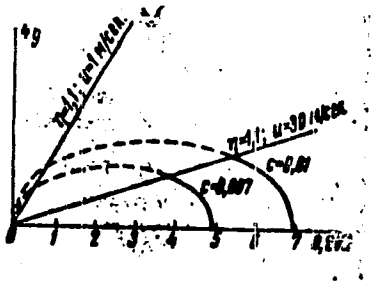


Fig.

Card 3/3

DEKHTYAR, M.I.

Theory of the diffusion of interstitial atoms in ordered alloys of the CuPt type. Ukr. fiz. zhur. 8 no.2:183-190 F '63. (MIRA 16:2)

1. Institut metallofiziki AN UkrSSR, Kiyev.
(Diffusion) (Copper-platinum alloys) (Atoms)

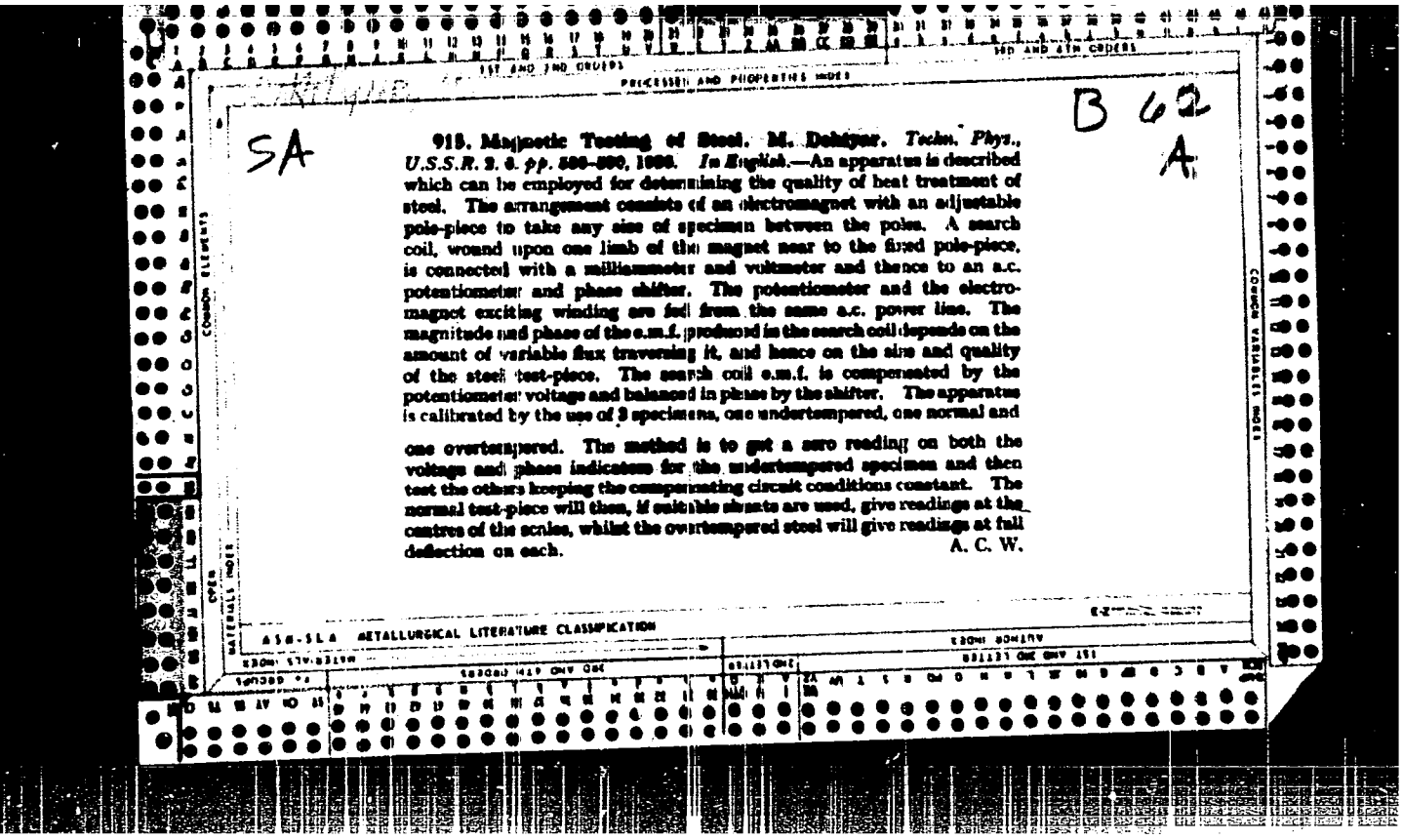
BUYKOV, M.V.; DEKHTYAR, M.I.; DUKHIN, S.S.

Theory of the large drop part of the spectrum of cloud drops. Izv.AN SSSR.Ser.geofiz. no.4:637-647 Ap '63. (MIRA 16:4)

1. Institut obshchey i neorganicheskoy khimii AN UkrSSR.
(Clouds--Spectra)

DEKHTYAR, M.I.; BUYKOV, M.V.

Fluctuations of the number of large drops in stratified clouds.
Trudy UkrNIGMI no.48:21-38 '65. (MIRA 18:8)

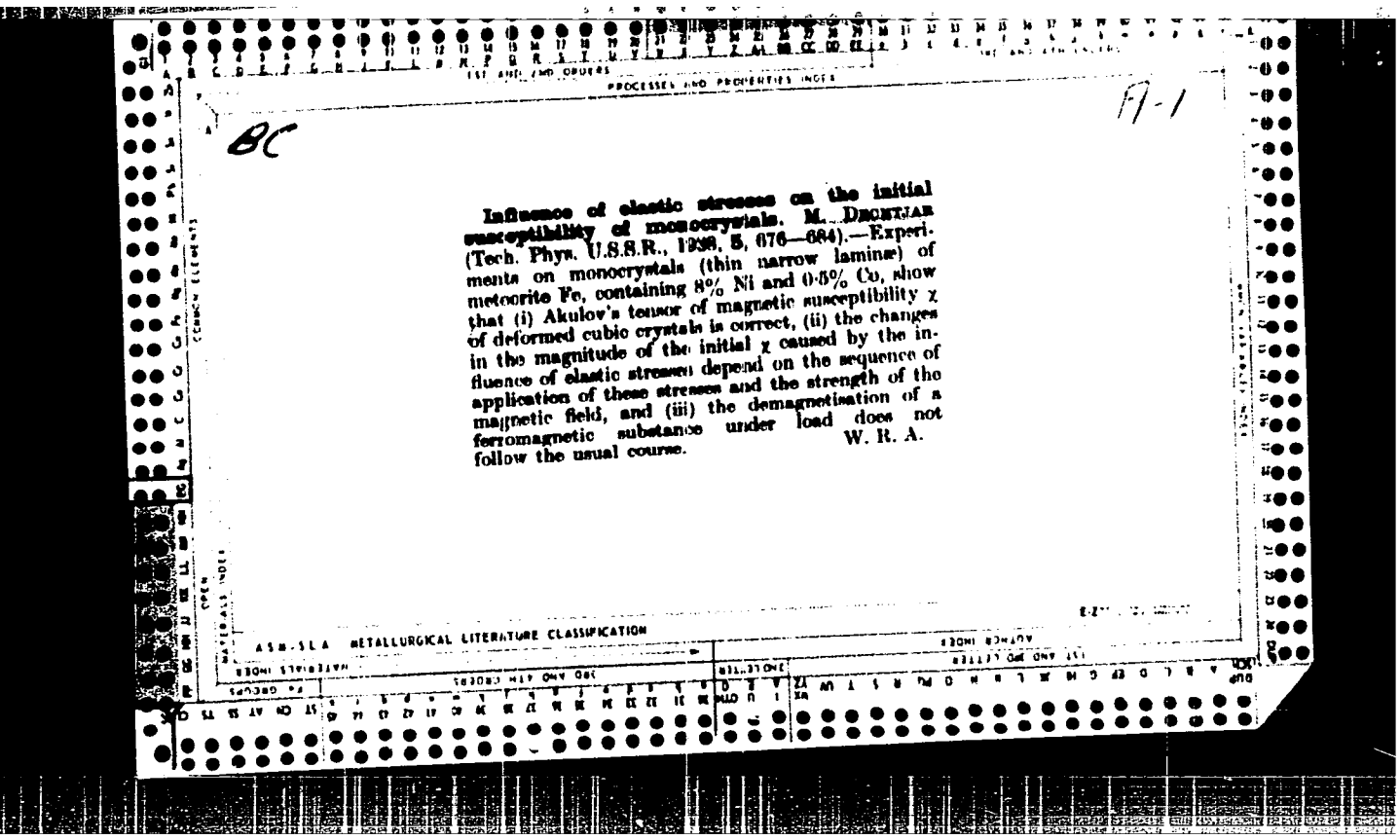


SA

B 62
A

915. **Magnetic Testing of Steel.** M. Dehlpar. *Techn. Phys., U.S.S.R.* 2. 6. *pp.* 500–500, 1936. *In English.*—An apparatus is described which can be employed for determining the quality of heat treatment of steel. The arrangement consists of an electromagnet with an adjustable pole-piece to take any size of specimen between the poles. A search coil, wound upon one limb of the magnet near to the fixed pole-piece, is connected with a milliammeter and voltmeter and thence to an a.c. potentiometer and phase shifter. The potentiometer and the electromagnet exciting winding are fed from the same a.c. power line. The magnitude and phase of the e.m.f. produced in the search coil depends on the amount of variable flux traversing it, and hence on the size and quality of the steel test-piece. The search coil e.m.f. is compensated by the potentiometer voltage and balanced in phase by the shifter. The apparatus is calibrated by the use of 3 specimens, one undertempered, one normal and one overtempered. The method is to get a zero reading on both the voltage and phase indicators for the undertempered specimen and then test the others keeping the compensating circuit conditions constant. The normal test-piece will then, if suitable shunts are used, give readings at the centres of the scales, whilst the overtempered steel will give readings at full deflection on each.

A. C. W.

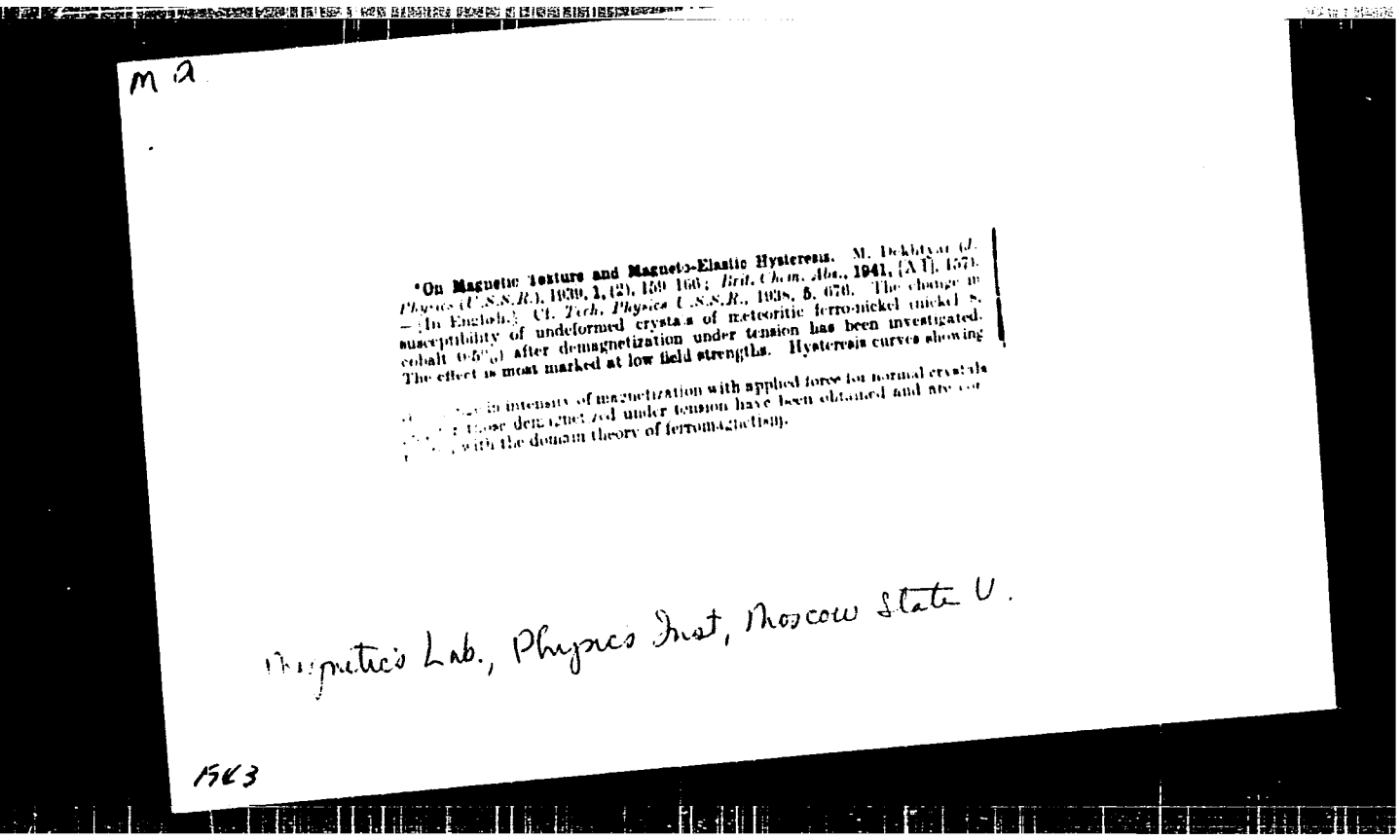


BC

A1-1

Influence of elastic stresses on the initial susceptibility of monocrystals. M. DRONIUK (Tech. Phys. U.S.S.R., 1938, 5, 676—684).—Experiments on monocrystals (thin narrow laminæ) of meteorite Fe, containing 8% Ni and 0·5% Co, show that (i) Akulov's tensor of magnetic susceptibility χ of deformed cubic crystals is correct, (ii) the changes in the magnitude of the initial χ caused by the influence of elastic stresses depend on the sequence of application of these stresses and the strength of the magnetic field, and (iii) the demagnetisation of a ferromagnetic substance under load does not follow the usual course. W. R. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

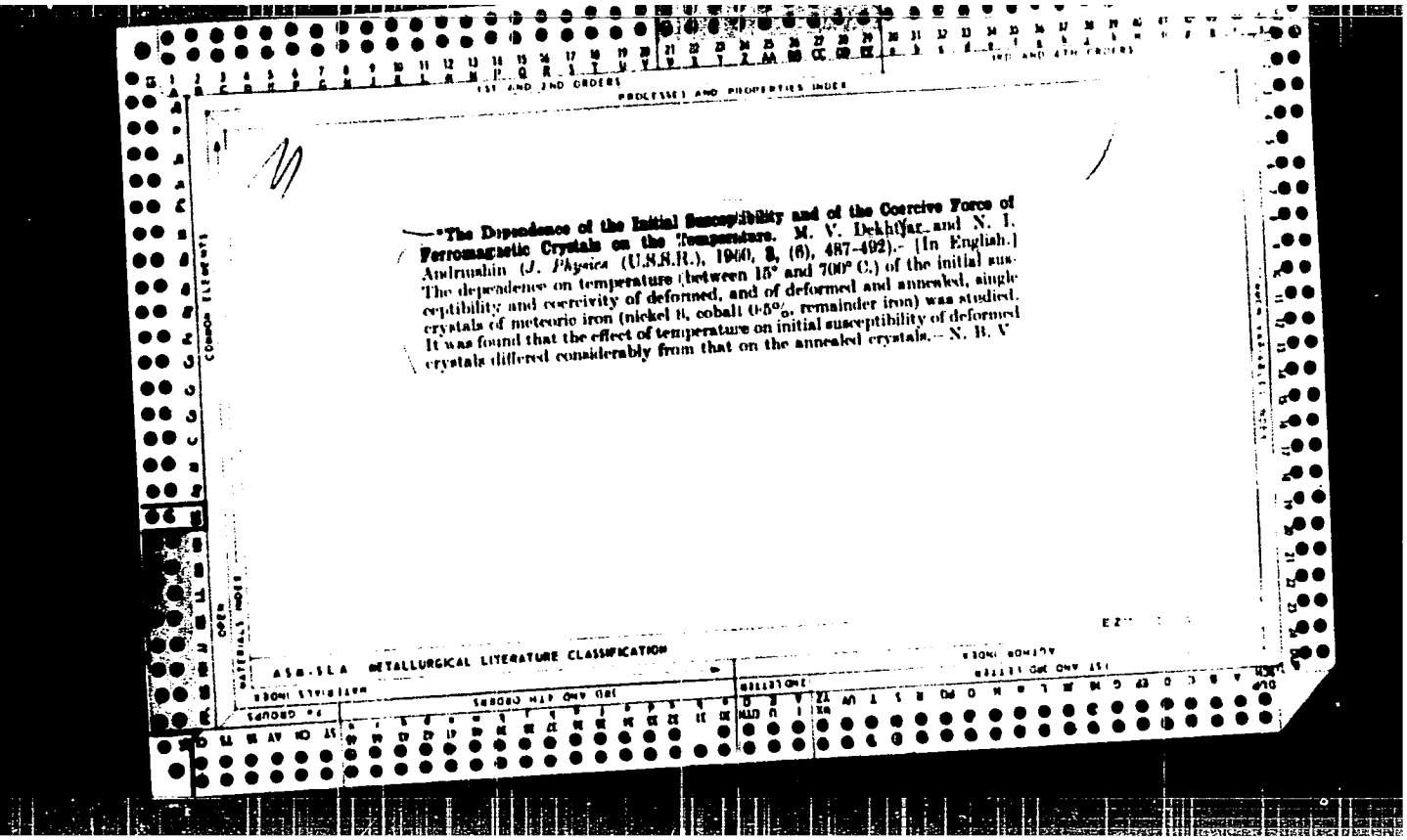


M 2

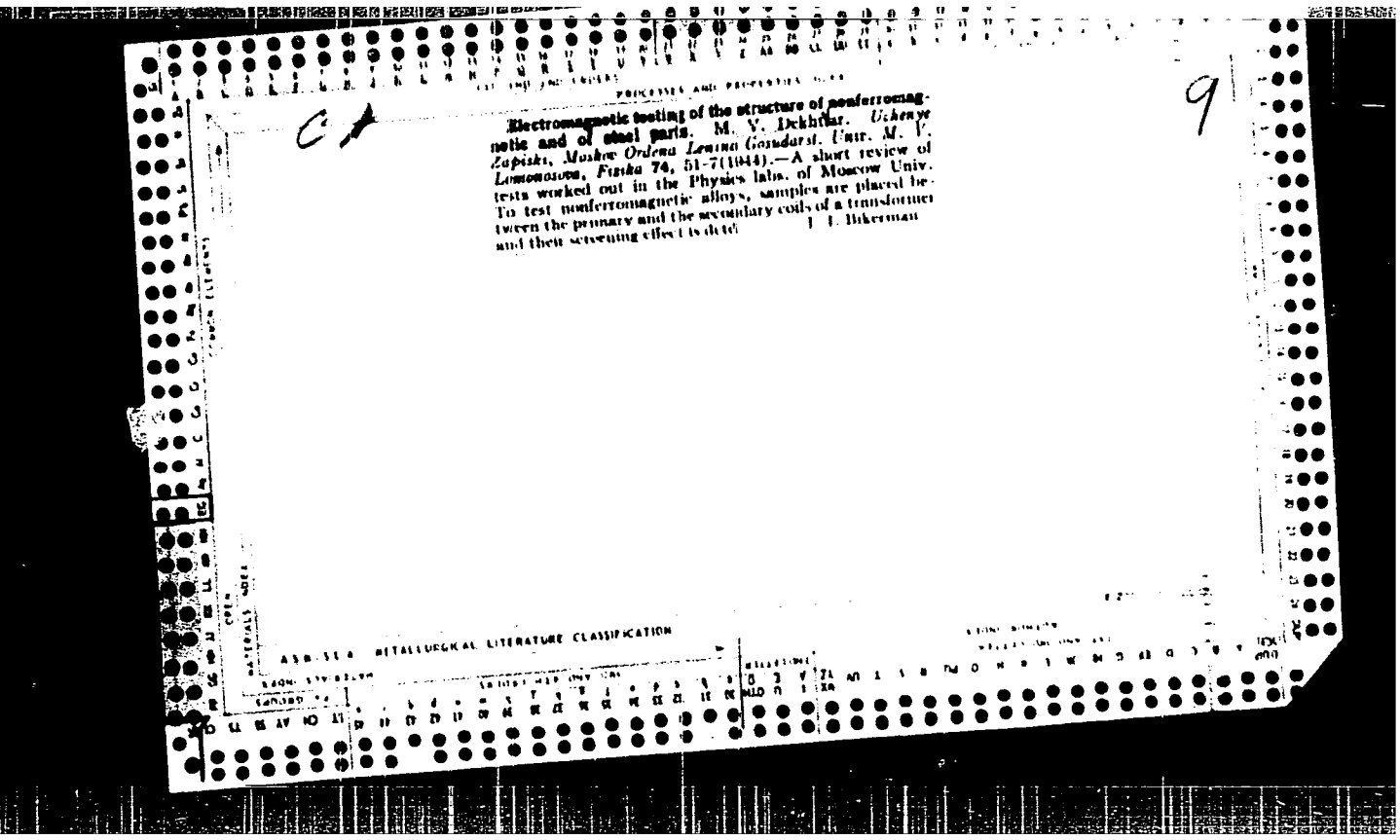
*On Magnetic Texture and Magneto-Elastic Hysteresis. M. Dekhtyar (J. Physics (U.S.S.R.), 1939, 1, (2), 159-166; Brit. Chem. Abs., 1941, (A I), 157). —(In English.) Cf. Tech. Physics (U.S.S.R., 1938, 5, 670. The change in susceptibility of undeformed crystals of meteoritic ferro-nickel (nickel 8, cobalt 0.6%) after demagnetization under tension has been investigated. The effect is most marked at low field strengths. Hysteresis curves showing [illegible] in intensity of magnetization with applied force for normal crystals [illegible] those demagnetized under tension have been obtained and are [illegible] with the domain theory of ferromagnetism.

Magnetics Lab., Physics Inst, Moscow State U.

1563



—"The Dependence of the Initial Susceptibility and of the Coercive Force of Ferromagnetic Crystals on the Temperature. M. V. Dekhtyar and N. I. Andrushin (*J. Physics* (U.S.S.R.), 1940, **3**, (6), 487–492).– [In English.] The dependence on temperature (between 15° and 700° C.) of the initial susceptibility and coercivity of deformed, and of deformed and annealed, single crystals of meteoric iron (nickel 8, cobalt 0·5%, remainder iron) was studied. It was found that the effect of temperature on initial susceptibility of deformed crystals differed considerably from that on the annealed crystals.—N. B. V



Electromagnetic testing of the structure of nonferromagnetic and of steel parts. M. V. Dekhtiar. *Uchenye Zapiski, Moskov Ordena Lenina Gosudarst. Univ. M. V. Lomonosova, Fizika* 74, 51-7(1944).—A short review of tests worked out in the Physics labs. of Moscow Univ. To test nonferromagnetic alloys, samples are placed between the primary and the secondary coils of a transformer and their screening effect is detd. J. J. Bikerman

DEKHTYAR, M. V.

Method of Sorting Steels Based on Sign of Thermoelectric Effect. S. V. Skorikov, A. I. Askenazi, and M. V. Dekhtyar. (Zavodskaya Laboratoriya, 1945, 11, 1, 95-98) A method and apparatus for rapid identification and separation of Cromansil steel from other carbon and alloy steels based on the sign of thermoelectric force are described. --v.g.

PROCESSES AND PROPERTIES INDEX

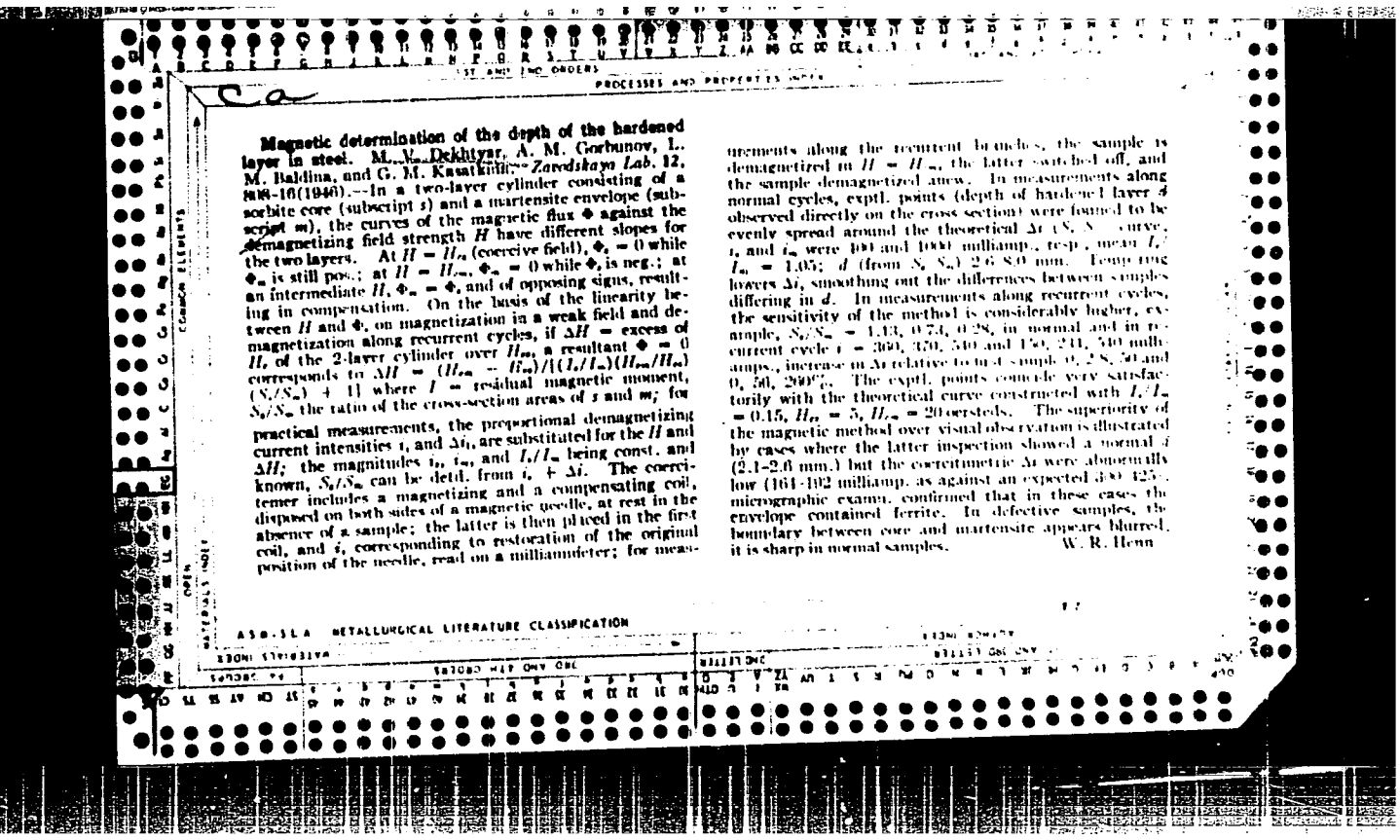
Ca

9

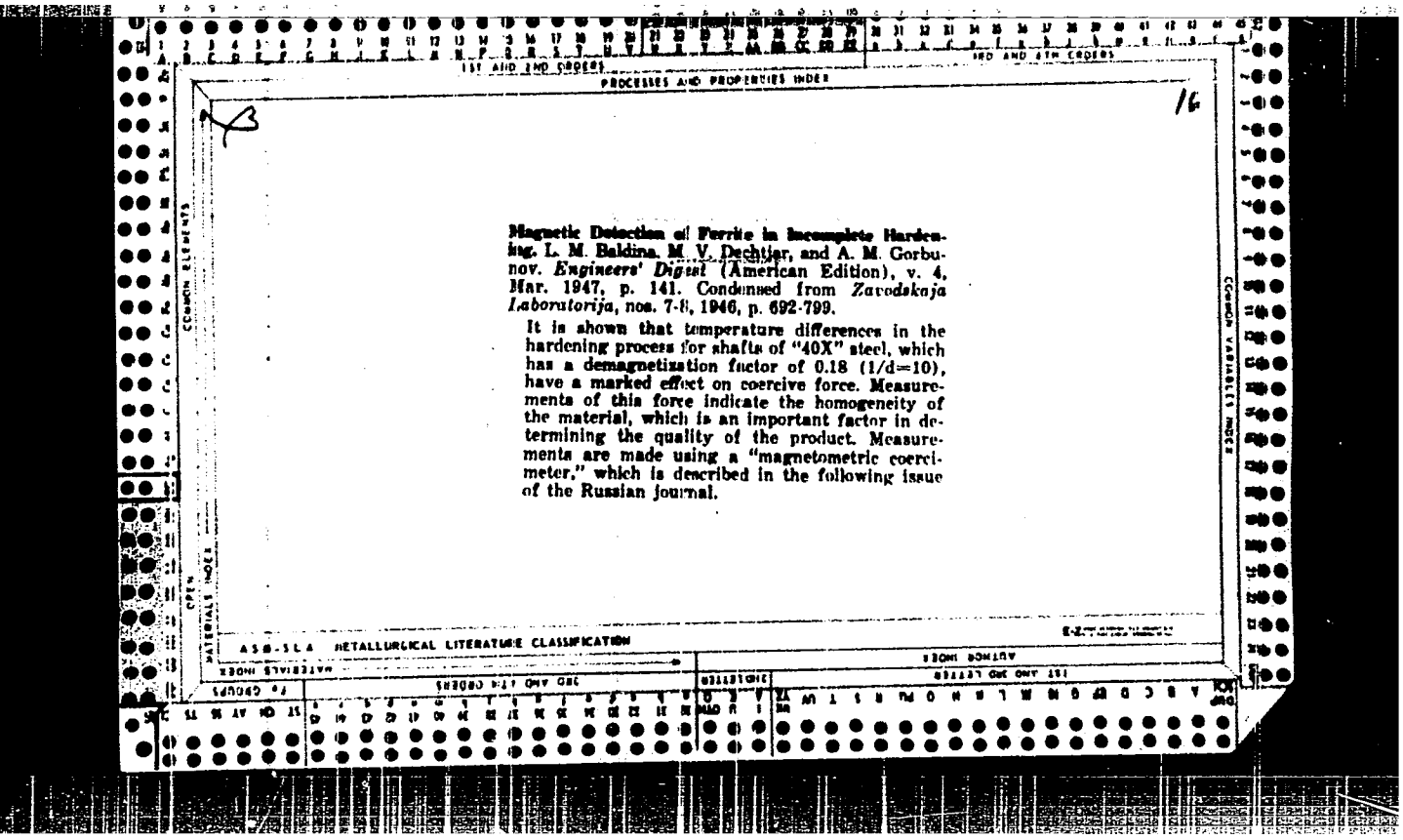
Determination of the state of martensite by magnetic permeability. M. V. Dekhtyar, V. I. Malovitskaya, and V. I. Shur. *Zavodskaya Lab.* 12, 00 75(1946). Detn. of magnetic permeability of tempered bearing steel in the region of max. values of μ_{max} is a good criterion for characterizing the state of martensite and for rapid detn. of the relative degree of dispersion of martensite crystals and concn. of solid soln. The max. magnetic permeability of tempered bearing steel decreases linearly with the increase in the temp. of heating in the region of the γ phase. It characterizes equally well the state of martensite both in the region of underheating and the region of overheating. Therefore, the detn. of hardness and of microstructure can be replaced by detn. of the magnetic permeability. The magnetic permeability in pearlite regions preserved during a sharp underheating was greater than that in steel tempered into martensite, regardless of the degree of its dispersion. Twenty-one references.

W. R. Henn

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



Magnetic determination of the depth of the hardened layer in steel. M. V. Dekhtyar, A. M. Gorbunov, L. M. Baldina, and G. M. Kasatkina.—*Zavodskaya Lab.* 12, 1018-16(1946).—In a two-layer cylinder consisting of a sorbite core (subscript *s*) and a martensite envelope (subscript *m*), the curves of the magnetic flux Φ against the demagnetizing field strength *H* have different slopes for the two layers. At $H = H_m$ (coercive field), $\Phi_s = 0$ while Φ_m is still pos.; at $H = H_{-m}$, $\Phi_{-m} = 0$ while Φ_s is neg.; at an intermediate *H*, $\Phi_m = \Phi_s$ and of opposing signs, resulting in compensation. On the basis of the linearity between *H* and Φ, on magnetization in a weak field and demagnetization along recurrent cycles, if ΔH = excess of *H*, of the 2-layer cylinder over H_m, a resultant $\Phi = 0$ corresponds to $\Delta H = (H_m - H_m)/[(I_r/I_m)(H_m/H_m)(S_s/S_m) + 1]$ where I = residual magnetic moment, S_s/S_m the ratio of the cross-section areas of *s* and *m*; for practical measurements, the proportional demagnetizing current intensities *i*, and Δi, are substituted for the *H* and ΔH; the magnitudes i_r, i_m, and I_r/I_m being const. and known, S_s/S_m can be detd. from i, + Δi. The coercimeter includes a magnetizing and a compensating coil, disposed on both sides of a magnetic needle, at rest in the absence of a sample; the latter is then placed in the first coil, and i_r corresponding to restoration of the original position of the needle, read on a milliammeter; for measurements along the recurrent branches, the sample is demagnetized in $H = H_m$, the latter switched off, and the sample demagnetized anew. In measurements along normal cycles, exptl. points (depth of hardened layer *d* observed directly on the cross section) were found to be evenly spread around the theoretical Δi (*S*, *S*$_m$) curve; i_r and i_m were 900 and 1000 milliamp., resp., mean I_r/I_m = 1.05; *d* (from *S*, *S*$_m$) 2.6-8.0 mm. Temp. rise lowers Δi, smoothing out the differences between samples differing in *d*. In measurements along recurrent cycles, the sensitivity of the method is considerably higher, example, S_s/S_m = 1.43, 0.74, 0.28, in normal and in recurrent cycle *i* = 360, 420, 540 and 150, 211, 540 milliamps., increase in Δi relative to hard sample 0, 2.8, 50 and 0, 50, 200%. The exptl. points coincide very satisfactorily with the theoretical curve constructed with I_r/I_m = 0.15, H_m = 5, H_{-m} = 20 oersteds. The superiority of the magnetic method over visual observation is illustrated by cases where the latter inspection showed a normal *d* (2.1-2.6 mm.) but the coercimetric Δi were abnormally low (161-192 milliamp. as against an expected 430-425); micrographic examn. confirmed that in these cases the envelope contained ferrite. In defective samples, the boundary between core and martensite appears blurred, it is sharp in normal samples. W. R. Henn



Magnetic Detection of Ferrite in Incomplete Hardening. L. M. Baldina, M. V. Dechtjar, and A. M. Gorbunov. *Engineers' Digest* (American Edition), v. 4, Mar. 1947, p. 141. Condensed from *Zavodskaja Laboratorija*, nos. 7-8, 1946, p. 692-799.

It is shown that temperature differences in the hardening process for shafts of "40X" steel, which has a demagnetization factor of 0.18 (1/d=10), have a marked effect on coercive force. Measurements of this force indicate the homogeneity of the material, which is an important factor in determining the quality of the product. Measurements are made using a "magnetometric coercimeter," which is described in the following issue of the Russian journal.

DEKHTYAR, M.

PA 13T83

USSR/Magnetic Fields
Cylinders

Feb 1947

"Coercive Force of Double Sheet Cylinders," M. Dekhtyar, 5 pp

"Jour Physics USSR" Vol. XI, No 2

Explanation of the physical meaning of the demagnetizing field of an inhomogeneous double sheet cylinder, showing that the magnitude of the demagnetizing field depends upon the geometry of layers, i.e., upon their cross section.

13T83

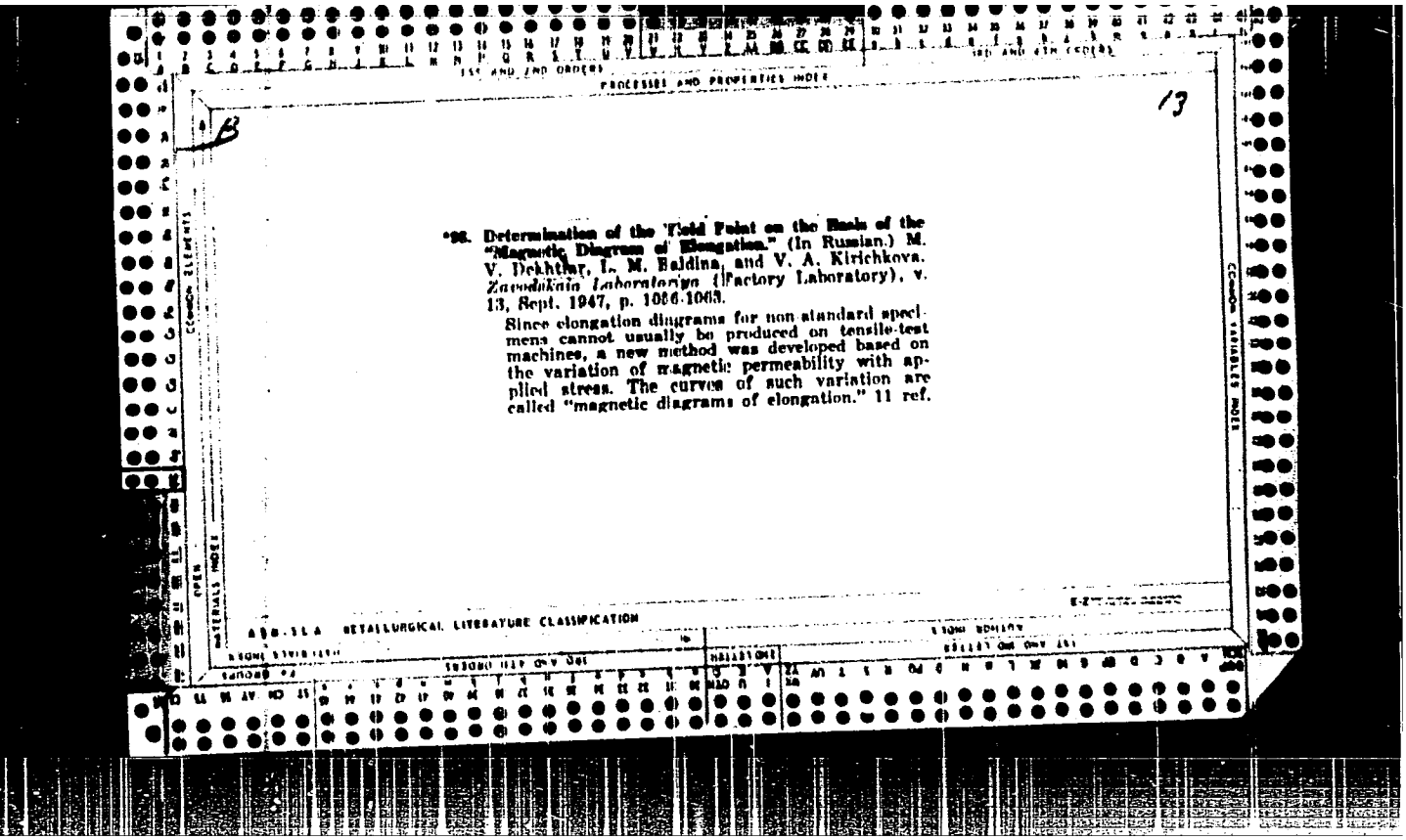
USSR/Phys Nov/Dec 1947
Ferromagnetism
Magnetic Measurements

"Magnetic Strain Diagram and Position of the Villari Point on the Magnetization Curve," M. V. Dekhtyar, Sci Res Inst Phys, Moscow State U, 17 pp

"Izv Akad Nauk SSSR, Ser Fiz" Vol XI, No 6

Author presents results of his research on the influence of initial distribution of elementary magnetic moments in elastic and plastic deformed ferromagnetics on its magnetic properties. Used results obtained in study of strain diagrams.

[redacted] 57T80



13

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*98. Determination of the Yield Point on the Basis of the "Magnetic Diagram of Elongation." (In Russian.) M. V. Dekhtyar, L. M. Baldina, and V. A. Kirichkova. *Zavodskaia Laboratoriya* (Factory Laboratory), v. 13, Sept. 1947, p. 1066-1068.

Since elongation diagrams for non-standard specimens cannot usually be produced on tensile-test machines, a new method was developed based on the variation of magnetic permeability with applied stress. The curves of such variation are called "magnetic diagrams of elongation." 11 ref.

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

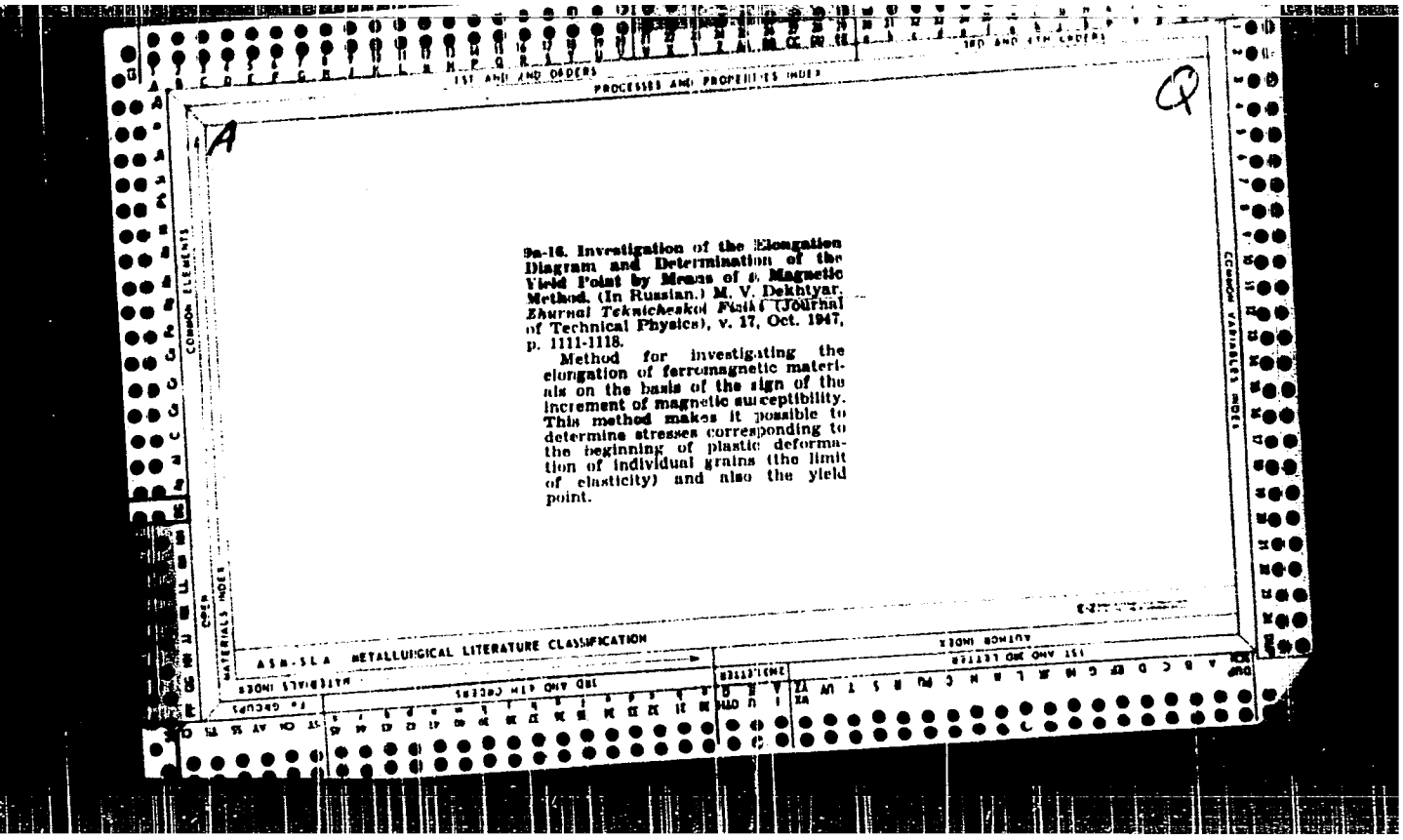
A P

3a-38. **Influence of the Arrangement of Magnetic Moments on the Magnetic Properties of Polycrystalline Ferromagnetic Materials.** (In Russian.) M. V. Dekhtyar and G. M. Raiskaya. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (Journal of Experimental and Theoretical Physics), v. 17, Oct. 1947, p. 911-914.

Results of a correlation of experimental data. 10 ref.

Moscow State U.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



9a-16. Investigation of the Elongation Diagram and Determination of the Yield Point by Means of a Magnetic Method. (In Russian.) M. V. Dekhtyar. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 17, Oct. 1947, p. 1111-1118.

Method for investigating the elongation of ferromagnetic materials on the basis of the sign of the increment of magnetic susceptibility. This method makes it possible to determine stresses corresponding to the beginning of plastic deformation of individual grains (the limit of elasticity) and also the yield point.

DEKHTYAR M.V.

PA 49T80

USSR/Physics
Strain
Magnetic Susceptibility

Oct 1947

"Study of Strain Diagrams, and Determination of the Limits of Flux Flow by Magnetic Method," M. V. Dekhtyar, 7½ pp

"Zhur Tekh Fiz" Vol XVII, No 10

Describes method to study strain diagrams of ferromagnets on the basis of increase in the amount of magnetic susceptibility. Permits determination of the charge, which conforms to the beginning of flow in various crystals (limits of elasticity), and also determination of the limits of flux flow. Shows

49T80

USSR/Physics (Contd)

Oct 1947

that individual steps of the process of deformation clearly evidenced only during formation of the texture of the elementary magnetic moments (back "spinov"), created by the continuous commutation of constant magnetic field, or as result of the effect of fluctuating magnetic field during subjection of sample to strain. Submitted, 28 May 1947.

49T80

USSR/Physics - Steel, Tempered Dec 49
Martensite

"Determination of the Depth of Penetration of the Martensite Zone in Tempered Steel by Magnetic Methods," M. V. Dekhtyar, Phys Faculty, Moscow State U, 11 pp

"Zhur Tekh Fiz" Vol XIX, No 12, pp 1397-1407

Gives results of Dekhtyar's own method of calculating the strength coefficient of a nonhomogeneous double-layer cylinder, based on fact that strength coefficient of such a ferromagnetic (Ir, or flux, equal 0) is not a constant characterizing the material, but

152T98

USSR/Physics - Steel, Tempered (Contd) Dec 49

is determined by relation of shell cross section and core. Method gives depth of penetration of martensite zone in tempered steel (annealing capacity). Gives results for steels of various chemical compositions.

Submitted 15 Mar 49.

Evaluation B-81183

152T98

DEKHTYAR, M. V.

DEKHTYAR, M. V.

155T69

USSR/Physics - Hysteresis
Ferromagnetics

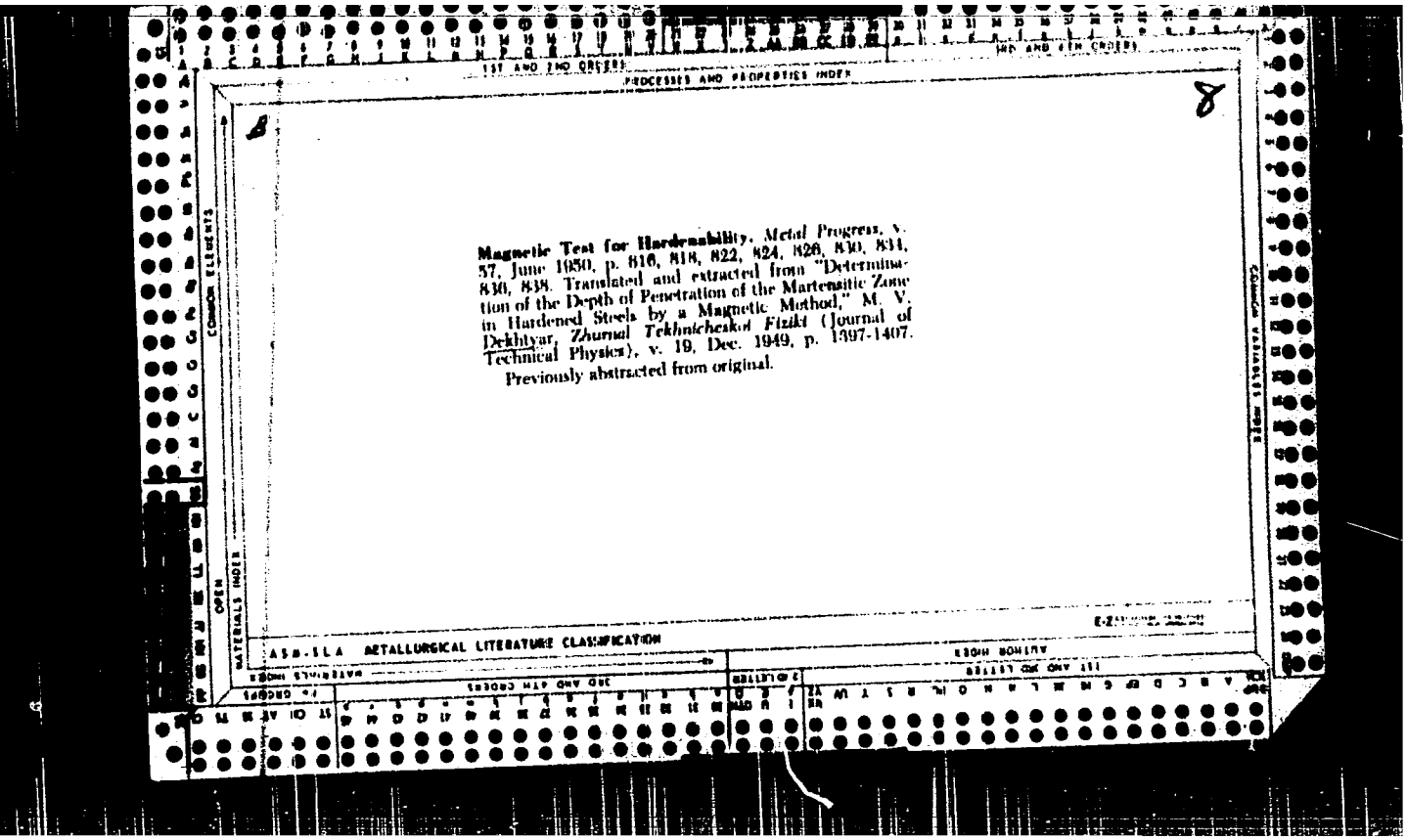
Dec 49

"Rectangular Loop of Magnetic Hysteresis of a Ferromagnetic Deformed in the Interval of Temperatures of Recrystallization," M. V. Dekhtyar, 4 pp

"Dok Ak Nauk SSSR" Vol LXIX, No 4

Discusses series of experiments in which the Barkhausen effect was created artificially in carbon steel wire (0.65% C) by action of external tensile force in process of crystal formation during recrystallization period. Submitted by Acad M. A. Leontovich 30 Sep 49.

155T69



Magnetic Test for Hardenability. *Metal Progress*, v. 57, June 1950, p. 816, 818, 822, 824, 826, 830, 834, 836, 838. Translated and extracted from "Determination of the Depth of Penetration of the Martensitic Zone in Hardened Steels by a Magnetic Method," M. V. Dekhtyar, *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 19, Dec. 1949, p. 1397-1407.

Previously abstracted from original.

SA
Sect A

Magnetism

2007. On a magnetic hysteresis loop approximating in form to a right angle. M. V. DMITRIYAN AND L. M. DMITRIYAR. *Dokl. Akad. Nauk SSSR*, 81, 533–6 (*No.* 4, 1951) *In Russian.*

Four wires of Permalloy (a Fe-Ni alloy) of dia. 0·5 mm were given the four following treatments respectively, after which the hysteresis curves were taken using an astatic magnetometer: (1) the wire was not given any preliminary treatment; (2) a stress of 57 kg/mm² was applied to the wire at room temp., followed by heating to 600 and maintaining this temp. for 15 min, the stress being then removed and the sample cooled to room temp.; (3) the wire was given a similar treatment to (2) but the stress was maintained during cooling; (4) the wire was given the same heat treatment but no stress was applied. Only for wire (2) was a hysteresis curve obtained which was right-angled. This tends to confirm the hypothesis advanced in Abstr. 496 (1951). Additional experiments showed that the steepness of the demagnetization part of the curve, for wire (2), increased with increasing rate of cooling. The Curie point for the wire was *c.* 400°. When a wire was given a similar heat treatment under stress to wire (2), but was cooled in a magnetic field of $H = 10$ Oe with a velocity of 3°/min, the curve lost its right-angled form. W. MOSKOW

Moscow State U.

DEKHTYAR, M.V.

A nearly rectangular magnetic hysteresis loop. Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 16, 653-63 '52. (MLRA 6:3)
(CA 47 no.19:9694 '53)

1. M.V.Lomonosov State Univ., Moscow.

Suggestions on how to obtain a hysteresis loop of rectangular shape by heating of sample to temps just above lower limits of recrystn and keeping charge near to mp. Recrystn during charging occurs under conditions specified.
251T35

USSR/ Physics

Card 1/1 Pub. 43 - 9/10

Authors : Dekhtyar, M. V.; Dekhtyar, L. M.; and Yurina, T. A.

Title : On the method of studying the phase transformations in non-metalic compounds (ferrites) and metallic alloys

Periodical : Izv. AN SSSR ser. fiz. 18/4, 502-510, Jul - Aug 1954

Abstract : A new device, developed by one of the authors, for studying the magnetic and non-magnetic characteristics of non-metallic compounds (ferrites) and metallic alloys is described. With the help of this device the following properties and processes can be easily observed or checked: phase transformations (from the paramagnetic into ferromagnetic state and vice versa), crystal formation in ferrites; dependence of magnetic and electric characteristics of ferrites at the temperature of their clinkering (magnetic permeability and ohmic resistance); gradual decomposition of austenite at all stages. Eleven references: 8-USSR; 3-German (1929-1953). Diagrams. Graphs.

Institution : Physical faculty of M. V. Lomonosov University of Moscow

Submitted : May 13, 1954

DEKHTYAR, M. V., (Moscow)

"The Temperature Dependance of Magnetic Properties and the Processes of Ordering in Alloy Fe-Ni-Mo," a paper submitted at the International Conference on Physics of Magnetic Phenomena, Sverdlovsk, 23-31 May 56.

Dekhtyar, M.V.

USSR/Magnetism - Ferromagnetism F-4

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 11993

Author : Dekhtyar, M.V.

Inst : Moscow State University, USSR.

Title : Effect of the Ordering Process on the Temperature Dependence of Magnetic Properties of Alloys of Fe-Ni, -Mo.

Orig Pub : Fiz. metallov i metallovediniye, 1956, 3, No 1, 55-61

Abstract : An investigation is made of the temperature dependence of the saturation magnetization I_s and the coercive force H_c of molybdenum-permalloy. The measurements were made with the aid of an astatic thermo-magnetometer. The deformed specimens exhibit the break on the curves, $I_s = f(t)$ in the interval 300 -- 400° (serving so to speak as evidence of the existence of two phases with different Curie points) and a sharp increase in H_c (of almost two orders of magnitude)

Card 1/2

SOV/56-34-3-49/55

AUTHOR: Dekhtyar, M. V.

TITLE: The Antiferromagnetic Orientation of the Magnetic Moments in the Ni_3Fe Alloy (Antiferromagnitnaya oriyentatsiya magnitnykh momentov v splave Ni_3Fe)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol. 34, Nr 5, pp. 772 - 773 (USSR)

ABSTRACT: The present work investigates the temperature dependence of the saturation magnetization I_s, of remanent magnetization I_r and of the coercive force H_c of the alloy Ni_3Fe within a wide temperature interval. The sample of a diameter of 0,5 mm to be investigated was enclosed in a thin quartz tube which was evacuated to 10^{-4} mm Hg , and which was annealed in water together with this quartz tube after having it kept at a temperature of 1200°C for two hours. The experimental points obtained in the heating within the range of from 300 - 600°C only have differences of 10 - 15°C in order to permit a more exact determination of the form of the temperature dependence of I_s, I_r and H_c. A diagram shows the temperature dependence of I_s and I_r. Within the interval

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The Antiferromagnetic Orientation of the Magnetic Moments in the Ni_3Fe Alloy

385 - 435°C the curve I_s has a level part. Within that interval the decrease of I_s in heating is compensated by the increase of I_s in consequence of the formation of a close order in the order of atoms within the crystal lattice of the hardened disordered alloy. Also the three-fold increase of I_r within the interval 415 - 435°C speaks in favor of a close order, while I_r practically does not change within the interval from room temperature to 415°K. About the same way H_c also changes. These results coincide with the anomaly of the temperature dependence of the specific heat observed within this interval. Within the narrow range of from 490 - 510° the remanent magnetic moment of the volume measured at the field strength H = 0 decreases sharply from 240 G to practically zero. The saturation magnetization here amounts to about 50 % of the value of I_s at room temperature. At higher temperatures the saturation at the temperatures investigated here is not reached and a compensation mint is observed on the curve I(T). The existence of a compensation temperature on the curve I(T) and the appearance of negative magnetic moments above these temperatures speak in favor of the existence of a non-compensated antiferromagnetic orientation of the spin moments. At

SOV/56-34-3-49/55

The Antiferromagnetic Orientation of the Magnetic Moments in the Ni_3Fe Alloy

about 574°C the alloy passes over from ferromagnetic to paramagnetic state. There are 1 figure and 6 references, 1 of which is Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: July 24, 1957

Card 3/3

67725

18.1141 SOV/126-7-3-23/44

AUTHORS: Dekhtyar, M.V. and Kazantseva, N. M.

TITLE: Anomalous Temperature Dependence of Magnetic Properties of Alloyed Permalloy and the Effect of the Ordering Process on its Magnetic Transition (Anomal'naya temperaturnaya zavisimost' magnitnykh svoystv legirovannogo permalloya i vliyaniye protsessa uporyadocheniya nayego magnitnoye prevrashcheniye)

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 7, Nr 3, pp 453-455 (USSR)

ABSTRACT: The authors studied the temperature dependence of magnetic properties of supermalloy on samples of 200 mm length and 0.2 mm diameter. The samples were annealed in evacuated (10^{-4} mm Hg) quartz tubes at 1200°C for 2 hours. The disordered structure at 1200°C was fixed by quenching in water. The authors measured the saturation magnetization I_s, the residual magnetic moment I_r, the maximum susceptibility χ and the coercive force H_c between room temperature and 450°C. Before each measurement the sample was held for 1 hour at the required temperature. After each measurement the sample was rapidly cooled to room temperature. Between 300 and 450°C the experimental

Card 1/3

Anomalous Temperature Dependence of Magnetic Properties of Alloyed Permalloy and the Effect of the Ordering Process on its Magnetic Transition

points were determined every 10°C. Figs 1 and 2 show the curves of the temperature dependences of I_s, I_r, χ and H_c obtained in this way. The authors found that on heating of quenched supermalloy to 300-340°C its structure changed irreversibly; short-range order was produced in the alloy. On further heating the new structure underwent two magnetic transitions. The first (reversible) occurred at 375°C and the samples lost most of their ferromagnetic properties. Between 375 and 448°C the magnetic moment in zero field was equal to zero (Fig 1). The coercive force of the alloy was also zero after removal of the magnetizing force. The magnetic susceptibility was smaller by three orders of magnitude between 375 and 448°C than the susceptibility below 375°C, but it was still large compared to the paramagnetic susceptibility. Consequently the alloy still had a large magnetic moment when in a magnetic field. At 448°C a second transition, to the paramagnetic state, was observed.

4

67725

SOV/126-7-3-28/44

Anomalous Temperature Dependence of Magnetic Properties of Alloyed Permalloy and the Effect of the Ordering Process on its Magnetic Transition.

There are 2 figures and 8 references, 4 of which are Soviet, 3 English and 1 French.

ASSOCIATION: Fizicheskiy fakul'tet Moskovskogo gosuniversiteta (Physics Department, Moscow State University)

4

SUBMITTED: December 7, 1957

Card 3/3

18.1141, 18.8100

66230

SOV/126-8-3-14/33

AUTHORS: Dekhtyar, M.V. and Kazantseva, N.M.

TITLE: Structural Changes and Anomalous Temperature Dependence of the Magnetic Properties of the Ni-Fe (50% Ni) Alloy

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 3, pp 412-416 (USSR)

ABSTRACT: Investigations of the magnetic and structural features of Ni_3Fe and alloyed permalloy have been published (Ref 1 to 8). The present investigation deals with the temperature dependence of a high (50-% Ni) iron-nickel alloy. Specimens hardened from 1200°C and after annealing leading to ordering were used. The measurements were carried out on 200 mm long, 0.3 mm diameter test pieces sealed in quartz tubes after evacuation to 10^{-4} mm Hg. After soaking at 1200°C for 2 hours the enclosed test piece was quenched in water. For carrying out measurements at elevated temperatures, the furnace, heated with a bifilar platinum wire heating coil, was placed into one of the coils of an astatic magnetometer. Temperature gradients in the specimen were reduced with the aid of non-magnetic heat conductors. Fig 1 shows

Card ~~1/4~~

Structural Changes and Anomalous Temperature Dependence of the Magnetic Properties of the Ni-Fe (50% Ni) Alloy

curves of saturation magnetization against temperature for the hardened (curve a) and the hardened and annealed (100 hours at 480°C) alloy. Curve a shows a break at 300 to 360 and indicates that the Curie temperature of the close-order structure then formed is above that of the disordered alloy. The formation of a close-order structure at about 300°C is clearly shown also in Fig 2, where coercive force and the magnetic susceptibility are plotted against temperature for the two states. Fig 3 shows the magnetic properties as functions of the annealing temperature. Fig 4 shows temperature curves of the coercive force and maximum susceptibility of the alloy cooled from 1200 to 600°C at 5°/min and then quenched in water. The coercive force of the alloy hardened from 1200°C and then subjected to 100 hours annealing at 480°C is shown as a function of temperature in Fig 5. The work showed that the change of magnetic properties of the alloy with temperature is anomalous: on heating, a sharp change occurs at 300 to 360°C, coercive force and saturation magnetization increasing

Card 2/4

Structural Changes and Anomalous Temperature Dependence of the Magnetic Properties of the Ni-Fe (50% Ni) Alloy

and maximum susceptibility decreasing. The anomaly disappears when specimens are kept for 100 hours at about 480°C. From a comparison of the present results with those obtained by M.V.Dekhtyar for Ni_3Fe (Ref 2,3) the authors conclude that at about 300°C a close-order process begins, in the initial stages of which distortions of the crystal lattice arise leading to an increase in coercive force and a reduction in the maximum susceptibility. Holding at 300 to 400°C gives a structural state whose free energy is lower than that of the disordered (hardened) solid solution. This state persists on cooling to room temperature, and the anomalous magnetic-property changes required by the hardened alloy during the annealing are irreversible and persist after cooling to room temperature. There are 5 figures and 11 references, 9 of which are Soviet and 2 English.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova (Moscow State University imeni M.V. Lomonosov)

24(3)

AUTHOR: Dekhtyar, M. V. SOV/48-23-3-2/34

TITLE: Structural Changes and Antiferromagnetic Properties of the Alloy Ni_3Fe and Other Alloys of the System Fe-Ni (Strukturnyye izmeneniya i antiferromagnitnyye svoystva splava Ni_3Fe i drugikh splavov sistemy Fe-Ni)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1959, Vol 23, Nr 3, pp 271-279 (USSR)

ABSTRACT: The experimental results obtained in the present paper show that in Fe-Ni-alloys the antiferromagnetic alignment of the magnetic moments at temperatures below those of transition are present in the paramagnetic state (Refs 10,11). A Ni_3Fe-alloy and a thermally processed alloy of the chemical composition of super-permalloy were investigated. Figure 1 shows the temperature dependence of I_s (saturation magnetization), I_r (remanent magnetization), H_c (coercive force) and χ_{max} (maximum susceptibility) for the disordered Ni_3Fe-alloy. In the investigation of the temperature dependence a number of anomalous effects was observed. In the

Card 1/3

case of disordered structure which was obtained by tempering at 1200° the anomalous temperature course of I_s and I_r at 400° indicates the process of ordering. With further heating a new magnetic structure forms at 510° - the antiferromagnetic alignment of the magnetic moments. This transformation is unusual, for the magnetic order does not disappear but it changes. This magnetic change in which a new magnetic structure forms is brought about by the change of the atomic structure. The second magnetic change, i.e. transition to the paramagnetic state, depends on the preceding processing of the alloy within the temperature range of from 575-600°. Similar results were obtained also for the alloyed permalloy. The results obtained by this investigation are in agreement with those obtained by Pratt (Ref 14). Figure 2 shows the time dependence of I_r and H_c of the hardened Ni_3Fe-alloy; figure 3 shows the change of I_r in the heating and the tempering of the hardened Ni_3Fe-alloys as well as temperature hysteresis;

figure 4 - shows the dependence of I_r, I_s and H_c of the hardened Ni_3Fe-alloy on the annealing temperature $t_{annealing}$; figure 5 shows the temperature dependence of I_r of the hardened Ni_3Fe-alloy in the case of irregular heating; figure 6 shows the course of temperature of I_r and I_s in the heating and the cooling of the alloyed permalloy; figure 7 shows the temperature course of H_c and χ_{max} in the heating and the cooling of the alloyed permalloy. There are 7 figures and 23 references, 15 of which are Soviet.

ASSOCIATION: Fizicheskiy fakul'tet Moskovskogo gos. universiteta im. M. V. Lomonosova (Physics Department of Moscow State University imeni M. V. Lomonosov)

33686
S/058/61/000/012/073/083
A058/A101

24 2200 1160 1164 1482

AUTHORS: Dekhtyar, M. V., Kazantseva, N. M.

TITLE: Anomalous temperature dependence and irreversible changes in magnetic properties of Ni-Fe alloy (50% Ni)

PERIODICAL: Referativnyy zhurnal, Fizika, no. 12, 1961, 391, abstract 12E746 (V sb. "Magnitn. struktura ferromagnetikov", Novosibirsk, Sib. otd. AN SSSR, 1960, 177 - 184)

TEXT: With the aid of an astatic magnetometer the temperature dependences of saturation magnetization I_s, residual magnetization I_r, maximum magnetic permeability μ_{max} and coercive force H_c of half-and-half Fe-Ni alloy were studied in specimens subjected to hardening at 1,200°C and ordering annealing at 480°C for 100 hours. In the range between 300°C and 360°C hardened specimens evince magnetic-property anomalies (a break in the I_s curves, peaks of I_r and H_c, a dip of μ_{max}) associated with the process of short-range order formation in the disordered alloy. Short-range order is not disturbed incident to subsequent cooling of the alloy held at ~360°C for a while. The indicated anomalies were not ob-

Card 1/2

33686
S/058/61/000/012/073/083
A058/A101

Anomalous temperature dependence and...

served in specimens annealed at 480°C.

L. Boyarskiy

[Abstracter's note: Complete translation]

Card 2/2